

COMPARATIVE ANALYSIS OF EARLY OUTCOMES IN PEDIATRIC PATIENTS WITH ANORECTAL MALFORMATIONS UNDERGOING VARIOUS ANORECTOPLASTY TECHNIQUES: A PROSPECTIVE STUDY

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Abstract

**Objective:** To determine the early outcomes observed in pediatric patients with anorectal malformations undergoing anorectoplasty and to compare it respect to various techniques

**Study design:** Descriptive Cross-Sectional Study

**Place of the study:** Department of Pediatric Surgery, Peoples University of Medical and Health Sciences for Women (PUMHSW)

**Methodology:** A total of 222 Pediatric patients of both genders had age between 3 months to 18 years diagnosed with anorectal malformations (ARMs) and underwent anorectoplasty (as per technique requirement) as per hospital standard criteria. All patients were followed up for three months (through telephone or visit for check-up) to assess the satisfactory bowel control and complications. Postoperative bowel control and continence levels were assessed using standardized assessment tools, which included the Krickenbeck classification system, Bowel Function Score, and Continence Grading System. SPSS-26 version was used to analyze the data. Quantitative data was presented as mean and standard deviation. Frequencies and percentages were reported for categorical variables. Further, satisfactory bowel control and complications were also stratified with respect anorectoplasty techniques.

**Results:** The mean age of the included patients was 1.42±0.76 years. 151 (68%) were male and 71 (32%) were female. 211 (95%) patients had PSARP anorectoplasty, 7 (3.15%) had TAPT and 2 (0.9%) had ASARP and LAARP each. After anorectoplasty, 184 (83%) had satisfactory bowel control. Further, patients were followed up for complications, wound infection observed in 13 (6%) cases, anal stenosis in 10 (4.5%) cases and fecal incontinence in 8 (3.6%) cases. postoperative outcomes and complications in pediatric patients with anorectal malformations with respect to different anorectoplasty techniques was almost same.

**Conclusion:** Male patients predominate in this study, which shows that the incidence of high of anorectal anomalies is more in male babies than the female babies. Anorectoplasty can successfully be done through any technique as per requirement. Over all the procedure is safe with good functional results.

## INTRODUCTION

Congenital abnormalities known as anorectal malformations (ARMs) impact a child's anus and rectum's anatomy and function.<sup>1</sup> Children with ARMs frequently have anorectoplasty, a surgical surgery that reconstructs the anorectal area. A variety of anorectoplasty procedures are used, each with unique benefits and possible drawbacks. However, the initial results of several anorectoplasty techniques for ARMs have been inconsistent.<sup>2</sup>

One commonly used method is posterior sagittal anorectoplasty (PSARP), which involves rectal reconstruction using a posterior approach and the formation of a new anal orifice.<sup>3</sup> According to studies, PSARP frequently results in positive functional outcomes, such as enhanced continence and bowel control.<sup>4</sup> On the other hand, the anterior sagittal anorectoplasty (ASARP) procedure shows promise in maintaining anal sphincter muscles and producing satisfactory cosmetic results by creating a new anal opening via an anterior route.<sup>5</sup> However, research comparing ASARP and PSARP methods is still in its infancy.<sup>6</sup>

Laparoscopically assisted anorectal pull-through (LAARP) and transanal pull-through (TAPT) are two more anorectoplasty versions. While TAPT entails accessing the rectum through the anus and generating a new anal opening, LAARP uses laparoscopic procedures to mobilize the rectum before drawing it through the pelvic floor muscles.<sup>7,8</sup> Both methods have demonstrated potential, frequently leading to less postoperative pain and shorter hospital stays.<sup>9</sup> But no research comparing the complications and results has ever been done.

This study was designed to explore the early outcomes observed in pediatric patients with ARMs undergoing anorectoplasty and to compare it respect to various techniques, including PSARP, ASARP, LAARP, and TAPT. Given the unique advantages and potential complications associated with each technique, the choice of an appropriate anorectoplasty approach is critical. While previous investigations have shown favorable results with PSARP in terms of functional aspects such as bowel control and continence, ASARP, LAARP, and TAPT offer promising outcomes, albeit with variations that necessitate further exploration.<sup>9,10</sup>

## Methodology:

The data collection process was started after approval of research protocol from Ethical Review Committee of the hospital. The data collection process for this prospective study involved obtaining informed consent from parents or guardians and recording demographic details. A total of 222 Pediatric patients of both genders had age between 3 months to 18 years diagnosed with anorectal malformations (ARMs) and underwent anorectoplasty for the management of ARMs at the Department of Pediatric Surgery, Peoples University of Medical and Health Sciences for Women (PUMHSW) were included via non-probability sampling technique. Patients with a history of previous anorectoplasty surgery or other significant anorectal interventions, patients with comorbid conditions that significantly influence the outcomes of anorectoplasty surgery (e.g., severe neurological disorders or complex systemic diseases) and patients lost to follow-up or those who failed to attend postoperative follow-up visits within the specified study duration were excluded from the study. OPENEPI calculator was used to calculate the sample size by taking the prevalence of wound infection 5.5%, margin of error = 3%, confidence interval = 95%. All the enrolled patients underwent for anorectoplasty (as per technique requirement) as per hospital standard criteria and were followed up for three months (through telephone or visit for check-up) to assess the satisfactory bowel control and complications. Postoperative bowel control and continence levels were assessed using standardized assessment tools, which included the Krickbeck classification system, Bowel Function Score, and Continence Grading System. This assessment entails evaluating various aspects such as bowel control, continence, stool consistency, voluntary bowel movements, and determining the presence or absence of fecal incontinence, where un-satisfactory bowel result indicated the presence of fecal incontinence, characterized by the inability to control bowel movements, while satisfactory result denoted the absence of fecal incontinence, suggested successful control over bowel movements. Data was entered and analyzed using SPSS statistical package version 26 software. Quantitative like age and duration of surgery were presented as mean and standard deviation.

Frequencies and percentages were reported for categorical variables, such as gender, residential status, satisfactory bowel control and complications. Further, satisfactory bowel control and complications were also stratified with respect anorectoplasty techniques.

**Results:**

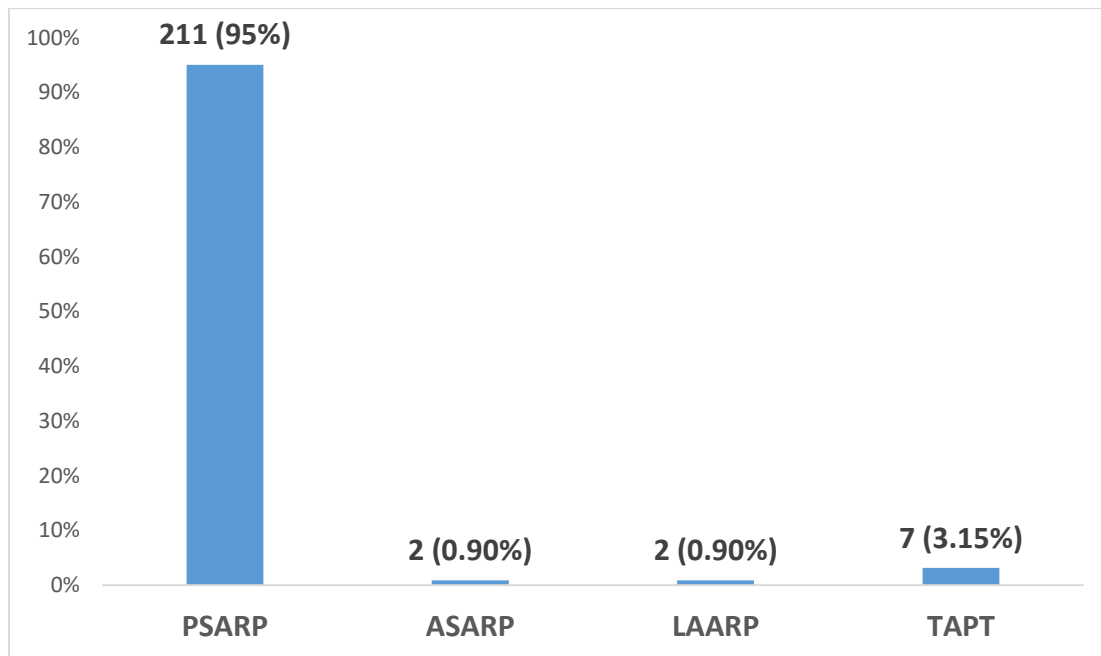
In this study, a total of 222 children diagnosed with anorectal malformations (ARMs) and underwent anorectoplasty were included. The mean age of the patients was 1.42±0.76 years. 151 (68%) were male and 71 (32%) were female. Most of the patients were urban resided 124 (56%). The mean duration of the

surgery was 107 ± 23.61 min, as shown in table #1. 211 (95%) patients had PSARP anorectoplasty, 7 (3.15%) had TAPT and 2 (0.9%) had ASARP and LAARP each, as shown in figure#1.

After anorectoplasty, 184 (83%) had satisfactory bowel control. Further, patients were followed up for complications, wound infection observed in 13 (6%) cases, anal stenosis in 10 (4.5%) cases and fecal incontinence in 8 (3.6%) cases, as shown in table# 2. Postoperative outcomes and complications in pediatric patients with anorectal malformations with respect to different anorectoplasty techniques were also compared, as shown in table #3.

**Table#1: Baseline Data of the Patients (n=222)**

| Characteristics     | (Mean ± sd)/n(%) |
|---------------------|------------------|
| Age (Years)         | 1.42±0.76        |
| Gender              |                  |
| • Male              | 151 (68%)        |
| • Female            | 71 (32%)         |
| Duration of surgery | 107 ± 23.61 min  |
| Residential status  |                  |
| • Urban             | 124 (56%)        |
| • Rural             | 98 (44%)         |



**Figure#1: Distribution of the Patients as per Anorectoplasty techniques**

**Table#2: Postoperative Outcomes and Complications in Pediatric Patients with Anorectal Malformations Undergoing Anorectoplasty**

| Outcomes/ Complications    | n(%)      |
|----------------------------|-----------|
| Satisfactory bowel control | 184 (83%) |
| <b>Complications</b>       |           |
| Wound Infection            | 13 (6%)   |
| Anal Stenosis              | 10 (4.5%) |
| Fecal Incontinence         | 8 (3.6%)  |

**Table#3: Comparison of Postoperative Outcomes and Complications in Pediatric Patients with Anorectal Malformations with respect to different Anorectoplasty Techniques**

| Outcomes/ Complications    | PSARP (n=211) | ASARP (n=2) | LAARP (n=2) | TAPT (n=7) |
|----------------------------|---------------|-------------|-------------|------------|
| Satisfactory bowel control | 183           | 01          | 01          | 03         |
| Wound Infection            | 12            | 00          | 00          | 01         |
| Anal Stenosis              | 07            | 01          | 00          | 02         |
| Fecal Incontinence         | 07            | 00          | 00          | 01         |

**Discussions:**

Anorectal malformations include a broad range of abnormalities, from minor anus malpositions with good functional results to intricate, challenging-to-manage urogenital and hindgut abnormalities.<sup>4</sup> Imperforate anus, as it is commonly called, affects 1 in 4000 to 5000 live births globally, with a small male predominance.<sup>5</sup> Although it can happen in isolation as, the anomaly is frequently linked to other abnormalities, with incidences ranging from 40 to 60% in various series. To maximize the chance of regular bowel function and continence, the goal of all corrective surgical techniques is anatomical rebuilding of the anorectal region. Because of its positive functional outcome and documented low rate of complications, posterior sagittal anorectoplasty (PSARP) has been the favored procedure since its first in 1982.<sup>9, 10</sup> Since its introduction in 1988, the anterior sagittal method to anorectoplasty has been used to treat anorectal abnormalities in female patients.<sup>6</sup> Numerous studies indicate that this method reduces injury to the sphincter and other critical tissues while offering good anatomical exposure to the operating field.<sup>7,11,12</sup>

According to our research and the findings of a retrospective review of a one-stage surgery, patients were mostly male and had an average age of 1.42±0.76 years. All of the patients in an Osifo OD study were

neonates with a male to female ratio of 1.5:1<sup>13</sup>. In a similar vein, research on single-stage procedures for anorectal abnormalities in neonates and later has been conducted both prospectively and retrospectively. Additionally, there are distinct research examining this treatment approach and its results solely in individuals who are male and female.<sup>6,14</sup> In our study, the mean operative time was 107 ± 23.61 minutes which is close to the operative time experienced by Upadhyaya VD (110 min), though it was just 50 minutes in a study by Ibrahim IA<sup>15,16</sup>.

The Krickebeck International Classification, which is founded on the consensus recommendations of international authority, was developed in 2005 in response to the recognition of rarer defects that had not previously been included in any classification and the advent of advanced surgical methods other than PSARP.<sup>17</sup> Three separate components make up this classification system: a category for surgical procedures, a category for diagnostic procedures, and a category for recording functional outcome criteria. The Krickebeck classification attempts to rationalize functional outcome among various clinical and surgical groups by incorporating all problems, including uncommon ones, and surgical choices. This will enable more meaningful comparisons.<sup>18</sup> Since this approach was only recently developed, there is a

dearth of literature on extensive long-term outcome studies that use these classifications, particularly in our area. Bowel function is the key long-term functional outcome for children with ARM, which is crucial since fecal incontinence and/or constipation continue to be significant postoperative problems that hinder these kids' social and psychological development.<sup>19,20</sup> Continence's, defined as the ability to initiate voluntary bowel movement with no soiling, regular bowel habits with no constipation, in turn defined as the passage of infrequent or hard stools, and overall quality of life, are the parameters looked at when assessing functional prognosis in such patients.<sup>15</sup> In this study, there were 32/52 (83%) children who were continent which is comparable to the findings of a study stated that fecal incontinence was seen in 3(7.14%) patients and satisfactory bowel habits were present in 37 (88.08%) patients.<sup>9</sup>

Perianal wound dehiscence in our study was observed in 6 % of patients. Contrary to our finding wound dehiscence was 0% in a study conducted by Menon P.<sup>21</sup> The figure was 5 % in a study conducted by Gupta A and 7.5% by Waheed T.<sup>22,23</sup>

Anal stenosis is a common complication after anorectoplasty, however 10 (4.5%) developed anal stenosis in current study. Rasool N and colleagues, et al to determine the technical suitability and outcome of ASARP in children and revealed that anal stenosis occurred in 2 patients (5.5%).<sup>9</sup> On the other hand, Rehman M, et al found that anal stenosis was developed in 28.5% cases after PSARP.<sup>10</sup>

Another frequent surgical consequence that significantly lowers children's quality of life is fecal incontinence.<sup>18</sup> The majority of researchers think that the external anal sphincter and pelvic floor muscles' prenatal development conditions determine the cause of postoperative fecal incontinence; whether the center of the pelvic floor striated muscle complex was where the rectum was anastomosed; The extent of the pelvic floor muscles' damage during the procedure.<sup>19</sup> The incidence of postoperative fecal incontinence in the current study was 8 (3.6%) which is in line with the findings of a study reporting that fecal incontinence was seen in 3(7.14%) patients.

There are some limitations in this study, mainly because the less follow-up, some complications may be missed out. Further single centered study and use of

non-probability sampling technique may limit the generalizability of the findings. The strength of the study is prospective study as most of the studies carried out in the past are retrospective in nature and may carry the biasness concerns. Secondly, a good sample size has been used in this study as compared the sample size used in previous studies.

## Conclusion:

This study's preponderance of male patients indicates that male babies are more likely than female neonates to have high anorectal abnormalities. Any procedure can be used to successfully do anorectoplasty, depending on the situation. Overall, the process is secure and produces useful outcomes. We recommend this procedure as the gold standard and the most appropriate for all patients with high and intermediate anorectal malformations because it is safe overall and produces good functional results in our setup that are roughly comparable to those reported by numerous other studies in the global literature.

## Ethical Considerations

The study's ethical issues include protecting patient confidentiality, getting parents' or legal guardians' informed consent prior to data collection, and carrying out the research in compliance with institutional review boards' ethical standards. Every facet of the study was governed by the ethical concepts of beneficence, non-maleficence, and justice in order to protect the participants' rights and welfare.

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