

Frequency of Wound Dehiscence in Posterior Sagittal Anorectoplasty in Children with Anorectal Malformations

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Abstract: Wound dehiscence is a clinically important postoperative complication after sagittal anorectoplasty in children with anorectal malformations. Its occurrence may be influenced not only by surgical factors but also by demographic and socioeconomic conditions. **Objective:** To determine the prevalence of wound dehiscence after posterior sagittal anorectoplasty in children with anorectal malformations and to assess its association with demographic and socioeconomic variables. **Methods:** This descriptive cross-sectional study was conducted in the Department of Pediatric Surgery, Sheikh Zayed Hospital and Medical College, Rahim Yar Khan, from 23 May 2025 to 23 August 2025. A total of 129 children aged 1 month to 13 years undergoing posterior sagittal anorectoplasty were enrolled through consecutive sampling. Demographic and socioeconomic characteristics were recorded using a structured pro forma. Wound dehiscence was assessed clinically at the first postoperative follow-up visit on day 10. Data were analyzed using SPSS version 25. Quantitative variables were summarized as mean and standard deviation, while categorical variables were presented as frequencies and percentages. Post-stratification analysis was performed, and associations were tested using the chi-square test or Fisher's exact test, as appropriate. A p-value of less than 0.05 was considered statistically significant. **Results:** Among 129 children, the mean age was 2.91 ± 1.77 years, and 61.2% were male. The overall prevalence of postoperative wound dehiscence was 30.2%. Wound dehiscence was significantly more frequent among children from rural areas than among those from urban areas (37.0% vs 18.8%; $p=0.029$). Higher proportions of wound dehiscence were also observed among children of illiterate mothers and those from low socioeconomic backgrounds, although these associations did not reach statistical significance. No significant association was found between wound dehiscence and age group or gender. **Conclusion:** Wound dehiscence occurred in nearly one-third of children after posterior sagittal anorectoplasty. Rural residence was significantly associated with a higher risk of wound dehiscence, suggesting that social and contextual determinants may influence postoperative outcomes in children with anorectal malformations.

Keywords: Anorectal Malformations, Surgical Wound Dehiscence, Child, Socioeconomic Factor

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Introduction

Anorectal malformations (ARMs) are among the most common gastrointestinal birth defects in newborn children, with a reported frequency of 1:3,000-5,000 live births worldwide (1, 2). The treatment of ARMs frequently includes complicated surgeries, and posterosagittal anorectoplasty (PSARP) has become the standard procedure. PSARP, first described by de Vries and Peña, is proposed for the correction of high and intermediate ARMs, in which the rectum is brought down to its normal position (1, 3). However, this technique is very useful, but complications such as wound dehiscence remain significant problems that may negatively influence postoperative outcomes and long-term functional results (1, 4).

Wound dehiscence following PSARP may occur for various reasons, such as the surgical procedure, patient age, and overall health. According to the literature, wound dehiscence rates may differ widely across studies, with some reporting rates of up to 10-15% and others up to 30% in some cohorts (5, 6), especially in developing countries, where healthcare resources may be insufficient (7). Recent innovative methods, such as the adoption of the para-U-stitch modification in PSARP, have demonstrated the potential to reduce the occurrence of this complication (4).

The systematic analysis of the existing information shows inconsistent results, with a considerable focus on the multifactorial nature of the wound-healing process in pediatric surgical patients. Longitudinal studies indicate that surgical procedures and postoperative care significantly influence the healing process. The implementation of standardized postoperative treatment programs in prospective observational studies has led to a significant reduction in wound dehiscence rates in some

populations, reinforcing the role of coordinated postoperative care (5, 8). Moreover, comparison of various surgical methods, such as laparoscopic-assisted ones, suggests that they can reduce recovery time and postoperative complications, but do not consistently reduce the incidence of wound dehiscence compared with open PSARP (9).

Among the Pakistani population, it is observed that the prevalence of ARMs, and consequently, the necessity of effective surgical intervention like PSARP, is increasing. The need to assess the variables affecting surgical outcomes in this group, especially the incidence of wound dehiscence, is urgent. The potential solution to these complications is to address them through local adjustments to surgical techniques and improvements to postoperative care protocols, which could significantly change patient outcomes (10, 11). The purpose of the current study is to assess the rates of wound dehiscence in patients who underwent PSARP on ARMs in a tertiary care setting in Pakistan, as part of the growing body of evidence, and potentially leading to the development of streamlined treatment modalities specific to a local healthcare setting.

Methodology

A descriptive cross-sectional study was conducted in the Department of Paediatric Surgery at Sheikh Zayed Hospital and Medical College, Rahim Yar Khan, Pakistan. The study was carried out over the 6 months from 23 May 2025 to 23 August 2025, and all consecutive pediatric patients diagnosed with anorectal malformations who underwent posterior sagittal anorectoplasty during the study period were assessed for eligibility. Children aged 1 month to 13 years, of either gender, were included. Patients with major associated congenital anomalies requiring staged

surgical procedures, those who underwent re-operations for previous failed repairs, and those with incomplete clinical records or who were lost to follow-up before the first postoperative assessment were excluded to ensure uniformity of outcome assessment.

The required sample size was calculated using the WHO sample size calculator for estimation of a single proportion, based on an anticipated prevalence of postoperative wound dehiscence of approximately 30%, a confidence level of 95%, and a margin of error of 8%, which yielded a minimum sample size close to the achieved cohort (12). A non-probability consecutive sampling technique was employed until the target sample size was completed. Ethical approval was obtained from the Institutional Review Board of Sheikh Zayed Medical College and Hospital prior to initiation of the study. Written informed consent was obtained from parents or legal guardians of all participating children after explaining the objectives and procedures of the study, and confidentiality of patient information was strictly maintained throughout the study.

Baseline demographic and socioeconomic information, including age, gender, area of residence (urban or rural), father’s occupation, mother’s educational level, and socioeconomic status, was recorded on a predesigned, structured pro forma at the time of admission. Clinical variables, including weight at the time of surgery, type of anorectal malformation, and details of the operative procedure, were documented from the medical records. All surgical procedures were performed using a standardized posterior sagittal anorectoplasty technique by consultant pediatric surgeons, in accordance with institutional protocols for perioperative care, including antibiotic prophylaxis, wound care, and postoperative analgesia, to minimize procedural variability.

The primary outcome measure was postoperative wound dehiscence, defined as partial or complete separation of the perineal wound margins, with or without discharge, identified on clinical examination at the first scheduled postoperative follow-up visit on the tenth postoperative day. Wound assessment was performed by the operating surgical team using standardized clinical criteria, and findings were recorded in the study proforma. Any signs of wound gaping, serous or purulent discharge, erythema, or need for secondary intervention were noted. Secondary variables included demographic and socioeconomic factors potentially associated with wound dehiscence.

Data were entered and analyzed using the Statistical Package for Social Sciences version 25.0. Quantitative variables such as age and weight were assessed for normality using the Shapiro–Wilk test. Normally distributed data were summarized as mean with standard deviation, whereas non-normally distributed variables were additionally described using median and interquartile range. Categorical variables were expressed as frequencies and percentages. Post-stratification was performed to assess associations between wound dehiscence and selected demographic and socioeconomic variables, including age groups, gender, residence, parental education, father’s occupation, and socioeconomic status. The chi-square test was used to evaluate associations between categorical variables, while Fisher’s exact test was applied where expected cell counts were less than five. A p-value of less than 0.05 was considered statistically significant for all analyses.

Results

The mean age of the participants was 2.91 ± 1.77 years, with a median age of 2.67 years (IQR: 1.67–3.67). Male children constituted the majority of the cohort (61.2%), reflecting the male predominance commonly reported in anorectal malformations. Most children lived in rural areas (62.8%), and nearly half of the families were from low socioeconomic backgrounds. (Table 1)

Table 1: Baseline demographic and socioeconomic characteristics of the study population (n = 129)

Variable	Category	n (%)
Age (years)	Mean ± SD	2.91 ± 1.77
	Median (IQR)	2.67 (1.67–3.67)

Gender	Male	79 (61.2%)
	Female	50 (38.8%)
Residence	Urban	48 (37.2%)
	Rural	81 (62.8%)
Father’s profession	Job	73 (56.6%)
	Business	41 (31.8%)
	Unemployed	15 (11.6%)
Mother’s education	Illiterate	41 (31.8%)
	Primary	33 (25.6%)
	Secondary	30 (23.3%)
	Matric and above	25 (19.4%)
Socioeconomic status	Low	64 (49.6%)
	Middle	53 (41.1%)
	High	12 (9.3%)

The overall frequency of postoperative wound dehiscence at the first follow-up visit was 30.2%, indicating that nearly one-third of children experienced wound-related complications following PSARP. (Table 2)

Table 2: Frequency of wound dehiscence among children undergoing PSARP (n = 129)

Outcome	n	%
Wound dehiscence (Yes)	39	30.2
Wound dehiscence (No)	90	69.8

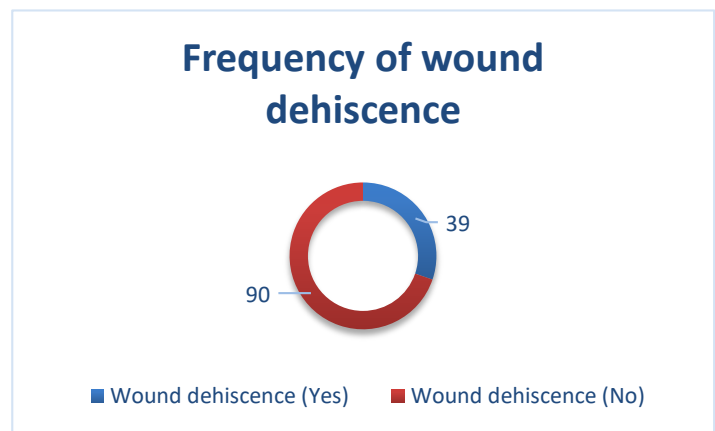


Figure 1: Distribution of wound Dehiscence in the study population

In stratified analysis, wound dehiscence was more frequently observed among children residing in rural areas than in urban areas (37.0% vs 18.8%), and this difference was statistically significant (p = 0.029). Higher proportions of wound dehiscence were also noted among children whose mothers were illiterate and those from low socioeconomic strata; however, these associations did not reach statistical significance. No significant differences were observed across age groups and gender categories. (Table 3)

Table 3: Association of demographic and socioeconomic factors with wound dehiscence (n = 129)

Factor	Category	Wound dehiscence n (%)	p-value
Age group	< 1 year	4 (28.6%)	0.891
	1–5 years	31 (29.7%)	
	≥ 5 years	5 (35.7%)	
Gender	Male	22 (29.1%)	0.459
	Female	17 (34.0%)	
Residence	Urban	9 (18.8%)	0.029
	Rural	30 (37.0%)	
Mother’s education	Illiterate	16 (39.0%)	0.104
	Primary	9 (27.3%)	

	Secondary	11 (36.7%)	
	Matric and above	3 (12.0%)	
Socioeconomic status	Low	23 (35.9%)	0.288
	Middle	12 (22.6%)	
	High	4 (33.3%)	

Discussion

The findings of our study indicate a significant incidence of wound dehiscence among children undergoing posterior sagittal anorectoplasty (PSARP) for anorectal malformations (ARMs). Specifically, the overall frequency of postoperative wound dehiscence observed was 30.2%, consistent with previous literature reporting a range of complications associated with PSARP. For example, studies have shown that rates of wound dehiscence can vary widely, typically ranging from 10% to 40%, largely influenced by surgical technique and patient demographics (1, 13). The findings of our study, therefore, align with the broader literature, highlighting that wound dehiscence remains a pertinent complication following PSARP.

The mean age of participants in our study was 2.91 years, with a predominance of males (61.2%), consistent with existing literature reporting a higher incidence of ARMs in male children (14, 15). The male-to-female ratio in our cohort is consistent with prior studies, which report a well-documented male predominance in ARM, with researchers such as Uddin et al. noting similar demographic trends in their investigations (1). Additionally, our study reflects a high proportion of participants from rural backgrounds (62.8%), compounded by socio-economic challenges; a finding echoed by Mustamin et al., who suggest that children from lower socioeconomic strata are at increased risk of complications due to limited access to healthcare facilities and resources (15).

The educational background of mothers in our cohort also emerged as a notable factor. While wound dehiscence rates did not differ statistically significantly by maternal education, a trend toward higher proportions among illiterate mothers was observed. This observation aligns with findings by Brisighelli et al., who emphasize the role of maternal education in improving children's health outcomes (14). Such correlations suggest that strengthening caregiver education and health awareness may improve postoperative outcomes for children undergoing PSARP.

The stratified analysis revealing significantly higher wound dehiscence rates in children residing in rural areas (37.0% vs 18.8% for urban dwellers, $p = 0.029$) mirrors earlier studies indicating that socio-economic and geographic factors influence postoperative complications in pediatric surgical populations (13, 16). These findings emphasize that rural residents may face barriers such as inadequate preoperative assessment, suboptimal postoperative care, and delayed access to specialist services, as highlighted by Tashiro et al. in their review of laparoscopic techniques and patient outcomes (16).

While our results indicate trends related to maternal education and socioeconomic status, they did not yield statistically significant associations with wound dehiscence outcomes, suggesting that further research may be necessary to elucidate these relationships fully. Moreover, a study by Rehman et al. proposed that enhanced preoperative education and awareness could mitigate complications associated with ARM surgeries (17). Addressing educational gaps among families with low health literacy could improve adherence to postoperative care routines, potentially reducing rates of wound dehiscence.

The wound dehiscence rate observed in our cohort (30.2%) is comparable to findings from other studies reporting postoperative complications following PSARP (18, 19). Notably, Knaus et al. discussed innovative techniques such as the para-U-stitch to minimize wound complications, suggesting a reduction in dehiscence rates through improved surgical methods⁴. Further, Tofft et al. highlighted the efficacy of standardized postoperative care in decreasing such rates, encouraging the adoption of structured follow-up protocols (5).

Additionally, complications such as fecal incontinence resulting from wound dehiscence can have long-term psychosocial impacts on affected children, as supported by research noting significant adverse effects on quality of life in pediatric patients dealing with these complications (20, 21). Our findings that show varying wound dehiscence associations with maternal education and socio-economic status support the broader narrative urging for a multidisciplinary approach to management, encompassing not just surgical intervention but also holistic family-centered care (19, 22).

In summary, the characteristics observed in our study population echo findings from the contemporary literature that emphasize the influence of demographic and socio-economic factors on surgical outcomes in children with ARMs. Addressing these disparities through improved maternal education, targeted pre- and postoperative care, and accessible healthcare services, particularly in rural settings, may significantly enhance clinical outcomes for this vulnerable population.

Conclusion

Postoperative wound dehiscence remains a common complication following posterior sagittal anorectoplasty in children with anorectal malformations in this tertiary care setting. The significantly higher risk observed among children from rural areas highlights the need for targeted perioperative support and structured postoperative follow-up strategies to improve surgical outcomes in resource-limited populations.

Declarations

Data Availability statement

All data generated or analysed during the study are included in the manuscript.

Ethics approval and consent to participate

Approved by the department concerned. (IRBEC-MZBSHG-012-25)

Consent for publication

Approved

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Conflict of interest

The authors declared no conflict of interest.

Author Contribution

SA, MR

Contributed to study design, data collection, and initial manuscript drafting

Assisted in data acquisition, literature review, and manuscript editing
Performed statistical analysis and contributed to the interpretation of results

Helped in methodology development, data organization, and manuscript formatting

RA, AAR, RK

Contributed to patient recruitment, data entry, and results compilation

Assisted in referencing, proofreading, and final revisions of the manuscript

Guided study execution and critically reviewed the manuscript

RK supervised the research, coordinated among the authors, finalized the manuscript, and approved the final version

All authors reviewed the results and approved the final version of the manuscript. They are also accountable for the study's integrity.

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