ORIGINAL ARTICLE

Factors Affecting the Neonatal Outcome with Anorectal Malformation in Underdeveloped Countries

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ABSTRACT

Background: With optimal perioperative and postoperative care, the survival and outcomes of new-born with anorectal malformations (ARM) have improved significantly in developed countries, but sepsis, low birth weight, late presentation, and intense new-born care is still lacking in developing countries influencing the outcome. This analysis was conducted to assess aspects for poor outcomes (mortality) in new-born with anorectal malformations.

Study Design: A prospective analytical study.

Place and duration: In the Department of Paediatric Surgery at Divisional Headquarters Teaching Hospital Mirpur for six months duration from January 2021 to June 2021.

Methods: 48 total consecutive neonates with anorectal malformations (ARMs) admitted to the Paediatric Surgery department were included. The studied variables comprised age at admission, birth weight, sex, type of malformation, sepsis at admission, type of surgery performed, postoperative issues, and their association with the results. Statistical analysis was executed with SPSS 21.0.

Results: 48 neonates with ARM were enrolled in the study. 60.4% (29) of the research population are male neonates and 39.6% (19) are female neonates. 2.3 ± 0.7 days was the mean age at admission (minimum age was 1 day and the maximum 4 days) and 2.8 ± 0.9 kg was the mean body weight at birth (minimum weight was 1.7 kg, and the maximum weight was 4.5 kg). The communal reason of mortality in patients postoperative was sepsis (50%). There was a statistically significant correlation amid sepsis and low birth weight (p = <0.01) on admission (p = 0.002) with mortality. Comparing the result with age at the time of presentation (p = 0.19) and complications postoperatively (p = 0.18), no statistically significant correlation was found.

Conclusions: Lack of trained midwives / LHV, Lack of resources, late admission, intensive care sepsis, and ultimately mortality are contributing factors in developing countries. Good prenatal care, awareness of midwives / community nurses to refer these patients on time, and adequate intensive care can improve the outcomes of ARM surgery.

Keywords: Sepsis, Imperforate anus, low birth weight, primary PSARP, cloaca and Pelvic divided colostomy

INTRODUCTION

Anorectal malformations (ARM) are measured to be one of the most common congenital bowel anomalies, with a frequency of 1 in 4,000 to 5,000 births, affecting slightly more men than women[1-2]. ARM is characterized by a wide spectrum of disease symptoms, ranging from minor defects to complex malformations such as permanent cloaca, and from isolated abnormalities to associations with atresia of the genitourinary system, heart, esophagus, gastrointestinal tract, vertebrae and limbs. In the past, mortality from ARMs has been high[3-4]. The first surgical intervention, though unsuccessful, took place in 1783 by performing an inguinal colostomy[5-6]. The score gradually improved as the understanding of the nature of the defect progressed and new management methods emerged[7-8]. The main determinant of poor prognosis in ARM is concomitant birth defects (20-80%). Other factors include delayed admission, sepsis, and intestinal perforation[9]. This study was conducted to evaluate age at presentation, low birth weight, sepsis, and postoperative complications as factors for poor outcomes (mortality) in neonates with ARM.

MATERIAL AND METHODS

This is a prospective descriptive study conducted at the Department of Paediatric Surgery at Divisional Headquarters Teaching Hospital Mirpur for six months duration from January 2021 to June 2021. 48 consecutive neonates with ARM were enrolled in the study. The data was collected in a structured format with approval from the Institutional Review Board. The studied variables comprised age at admission, birth weight, sex, type of malformation, sepsis at admission, type of surgery performed, postoperative issues, and their association with the results such as survival or mortality. After patients stabilized, a detailed history was taken and a thorough physical evaluation was accomplished to classify the type of ARM and other apparent accompanying abnormalities. A thorough examination of the perineum confirmed the presence of recto-vestibular fistula (RVF), perineal fistula and persistent cloaca. Neonates with meconium in the meatus without urinating were classified as recto-urethral fistulas, and cases where urine mixed with meconium during urination was classified as recto-bladder neck fistula. A lateral cross table-x-ray was done in neonates with the ARM without a fistula was taken to determine the level of the distal shadow of the gas. An ultrasound was performed to identify related genitourinary anomalies. Echocardiography was not performed because it was not found. All neonates were treated in the children's surgery room. A split pelvic colostomy was performed into the descending colon after the first resuscitation in cases with recto-bladder neck fistula, recto-urethral fistula, bladder neck fistula, and ARM deprived of fistula where distal gas shadow >1 cm from the anal pit. Primary Posterior Sagittal Anorectoplasty (PSARP) was accomplished in patients of ARM and Rectovestibular fistula and Primary limited Posterior Sagittal Anorectoplasty with perineal fistula. Patients were monitored for postoperative complications. Patients were divided into two groups according to birth weight < 2.5 kg and over 2.5 kg. In laboratory studies, sepsis was defined as leucocytosis / leukopenia, thrombocytopenia, prolongation of prothrombin time and international normalized ratio (INR), positive C-reactive protein and fibrin degradation products. Statistical analysis was executed using the statistical SPSS version 21.0. Descriptive statistics were calculated as the mean and S.D for quantitative data, and percentages and frequencies for qualitative data. The chi-square test was used to correlate various parameters with the result. A p value of <0.05 was measured significant. Written knowledgeable permission was attained from parents / guardians and consent from the ethics review body to conduct the study.

RESULTS

48 neonates with ARM were enrolled in the study. 60.4% (29) of the research population are male neonates and 39.6% (19) are

female neonates. 2.3 ± 0.7 days was the mean age at admission (minimum age was 1 day and the maximum 4 days) and 2.8 ± 0.9 kg was the mean body weight at birth (minimum weight was 1.7 kg, and the maximum weight was 4.5 kg). The type of anorectal malformations in the presented infants is presented in Table 1.

Table 1: Types of Anorectal Malformations (ARM)

Type	Frequency	Percentage
ARM with perineal fistula	10	20.8
ARM with recto-urethral fistula	3	6.3
ARM with recto-bladder neck fistula	3	6.3
ARM with recto-vestibular fistula	12	25
ARM without fistula	15	31.3
Common cloaca	5	10.4

Total mortality rate was 14(29.2%), and 7 (14.6%) of subjects expired before surgery. On admission, 27.1% (n = 13) of infants had sepsis, and all patients came after 24 hours. The types of operations performed in the remaining 41 neonates are presented in Table 2. Complications were: Anal stenosis treated with rectal dilatation in 5 patients with primary PSARP, wound dehiscence in 2 patients managed conservatively and postoperative sepsis in 5 patients. In our study, 66.7% (n = 32) of patients were discharged home with a satisfactory improvement. The communal reason of mortality in patients postoperative was sepsis (50%).

Table 2: Surgeries achieved in various types of ARMs

Type of malformation	Pelvic Divided Colostomy	Primary PSARP*
ARM with perineal fistula	0	5
ARM with recto-urethral fistula	3	0
ARM with recto-bladder neck fistula	1	0
ARM with recto-vestibular fistula	5	6
ARM without fistula	17	0
Common cloaca	5	0

Various variables such as age at admission, birth weight, sepsis at presentation, and postoperative complications were compared to determine their association with outcomes. There was a statistically significant correlation between low birth weight and mortality (p = <0.01). Mortality of neonates with birth weight < 2.5 kg was 57.9% (11/19). Only 9.1% (2/22) of patients with birth weight over 2.5 kg died. There was also a significant correlation between sepsis on admission and mortality (p = 0.002). Seven out of ten sepsis patients died during the presentation. Comparing the result with age at admission (P = 0.19) and postoperative complications (P = 0.18), no statistically significant correlation was found Table 3.

Table 3. Relationship of various variables with poor outcome

Variable	p-value
Low birth weight	<0.01
Sepsis at presentation	0.002
Delayed presentation (after 24 hrs)	0.19
Postoperative complications	0.18

DISCUSSION

Neonates with ARM are traditionally treated with step-by-step procedures that include first-stage deflection of the colostomy and final repair in the second stage, followed by closure of the colostomy in the third stage[9-10]. Recently, patients with small malformations such as recto-vesical fistula in girls are increasingly being treated as a one-step procedure, primary PSARP, to prevent colostomy morbidity[11]. Our practice is to perform incremental procedures on the primary PSARP with low developmental defects and high ARM. Various factors affect the ARM score in the neonatal period. In our study, one of the most important factors influencing the ARM score was low birth weight (LDA). A large

retrospective study by Cassina et al. Found that low birth weight (2.5 kg <2.5 kg) are significant risk factors for death in ARM (p = 0.002)[12]. In another study, ARM mortality was assessed by birth weight, dividing the study population by appropriate birth weight (> 2.5 kg) and low birth weight (<2.5 kg). Similar results from Chirdan et al[13-14]. The overall prevalence of low birth weight is 22.9%. The estimated prevalence of low birth weight in developing countries is higher (17%) than in developed countries. Intrauterine growth restriction is the main cause of low birth weight in Asian developing countries under the influence of maternal and socioeconomic factors, growth restriction before and after pregnancy[15]. Pakistan has one of the highest incidences of low birth weight, ranging from 19% in urban areas to 32% in rural areas[16]. Low birth weight neonatal deaths can be red by raising public awareness by organizing nutrition education programs for pregnant women by health workers and Pakistan Public Health Experts. Therefore, advances in antenatal care may reduce the overall mortality rate of neonates with ARMs. In our study, sepsis was significantly associated with poor outcomes. Bima et al. Examined risk factors for mortality in patients with ARM in Palembang and found that sepsis was an important risk factor for neonatal mortality (p = 0.049)[17-18]. Another study in Nigeria found sepsis to be a major contributor to infant mortality in ARM. Age at admission had no effect on the results of our study. However, in the Nigerian study, late admission was associated with poor outcomes[19-20]. Late presentation was also a risk factor for mortality in the Indian study. However, none of the studies determined the mean age at presentation. The difference between the results in our study may be due to the average age of admission. In our study, the mean age of admission was 2.3 days and the maximum age was 4 days[21]. The higher mean age at presentation may be the reason for a significant association with the poor performance in these studies. Another factor that may cause variation in the results of these studies is sample size[22]. The sample size in both studies is almost twice as large as in our study. There are other factors that influence the outcome in infants with ARM that were not covered in our study but have been investigated by other authors. According to Dastamuar et al. He found a significant relationship between the type of ADR and mortality[23-24]. According to their research, high ARM was significantly associated with mortality (P = 0.036). According to Cassina et al. The presence of two or more additional serious congenital malformations was significantly associated with poor prognosis (HR 7.9; 95% CI 2.2-27.8; P = 0.001)[25]. A study in India found that in addition to low birth weight, significant abnormalities and delayed remission are important factors influencing the outcomes of neonates with ARM.

CONCLUSION

It has been shown that low birth weight and sepsis are poor prognostic factors in our cohort of patient cohort. In poor countries, lack of resources, lack of education, midwives / community nurses, and intensive care are factors that contribute to sepsis, late presentation, and ultimately mortality. Good prenatal care, midwife / LHV awareness to refer these patients in time, and adequate intensive care can improve the outcomes of ARM surgery.

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