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Preoperative Assessment and Postoperative Outcome of Surgically Correctable Birth Defects at BSMMU in Bangladesh

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Abstract

Background: *Congenital anomalies are a significant cause of early childhood morbidity and mortality, often requiring early surgical intervention for optimal outcomes. Understanding the clinical spectrum, maternal factors, surgical management and postoperative outcome can guide better multidisciplinary care for affected children in Bangladesh.*

Methods: *This prospective observational study was conducted in the Department of Pediatric Surgery, Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, in two phases: Phase 1 (2020–2021) and Phase 2 (2022–2024). A total of 150 patients aged 0–18 years with surgically correctable birth defects were included. Data were collected through detailed history taking, examination, imaging, karyotyping when indicated, counseling, operative notes and follow-up records. All patients underwent preoperative evaluation, reconstructive surgery and postoperative assessment tools of physical, psychological and social outcomes*

Results: *The mean age of participants was 3.14 ± 3.39 years, with a male predominance (67.33%). A family history of congenital defects was noted in 14% of cases and 44.67% required NICU admission. Common diagnoses included coronal hypospadias (12.67%), Hirschsprung disease (7.33%) and cleft soft palate (6%). Hypospadias repair (23.33%) and excision with repair (21.33%) were the most frequent procedures. Postoperative complications were absent in 68% of cases, while 7.3% developed urethrocutaneous fistula and 2% had surgical site infections. Physical health improvement was achieved in 80% of patients.*

Conclusion: *Early diagnosis, multidisciplinary surgical management and postoperative support significantly improve health outcomes and quality of life in children with congenital anomalies.*

Keywords: *Congenital anomalies, pediatric surgery, reconstructive surgery, postoperative outcome.*

1. INTRODUCTION

Congenital anomalies or birth defects comprise a wide range of abnormalities of body structure or function that are present at birth and are of prenatal origin. These include the structural defects that have significant medical, social or cosmetic consequences for the affected individual and typically require medical and/or surgical intervention. Some of these defects are obvious at birth, while the others become clinically apparent as the child grows. Congenital anomalies represent a significant problem of perinatal mortality and morbidity [1].

Unfortunately, prevention of these is mostly unavailable. However, during the recent five decades, advances in diagnostic and surgical

techniques have provided a new opportunity for both prenatal prevention and postnatal correction of certain congenital anomalies [2]. If surgery is the 'neglected stepchild of global health', pediatric surgery is the child not yet born. Despite powerful stride forward in the treatment of birth defects, the benefits of these diagnostic and therapeutic advances have been largely confined to high income countries [3], where many once fatal conditions can now be treated with mortality rates <10%. In contrast, mortality rates for common anomalies from hospital-based data in developing countries like Bangladesh often rises up to 20-85% due considerable limitations of approach such as, diagnosis, treatment and follow-up because of lack of specialized personnel, inadequate facilities, poverty and ignorance [4]. Patients with immediately life-threatening conditions may die in transit or at home and never be entered in such hospital-based measures.

In south-east Asian region 1 in 33 infants has a birth defect; 1 in 260 infant dies because of birth defects; 1 in every 100 expected births in some countries are terminated because of a birth defect [5].

In Bangladesh, most commonly encountered surgically correctable birth defects are: neural tube defects (NTD), cleft lip and cleft palate, hernia, hydrocele, urogenital anomalies (PUJ Obstruction, VUJ obstruction, Hypospadias, Undescendent testes, etc.), anorectal malformations, Hirschsprung disease, limb defect including club foot [6, 7]. The management of these anomalies as well as the associated morbidity and mortality constitute a significant healthcare problem. Overcoming this problem remains one of the greatest challenges for pediatric surgeons [8, 9].

2. OBJECTIVE

The objective of this study was to evaluate surgically correctable birth defects and its management outcome.

3. METHODOLOGY & MATERIALS

This prospective observational study was conducted in the Department of Pediatric Surgery of Bangabandhu Sheikh Mujib Medical University (BSMMU) and included all patients aged 0–18 years who presented with surgically correctable birth defects. The study was conducted in two phases: Phase 1 (2020–2021) and Phase 2 (2022–2024). Prior to surgery, all patients underwent preoperative anesthetic evaluation and baseline investigations. A total of 150 patients were enrolled in the study. Each patient was evaluated through several data sources, including detailed history taking with psychological support provided to parents and relatives; thorough examination of the anomalous body part with ensured privacy and informed consent; relevant imaging studies such as ultrasonography (USG), X-ray and CT scan; and chromosomal analysis or karyotyping when indicated, particularly to detect disorders of sex development or for gender assignment. Counseling was provided to parents based on the pathogenesis, diagnostic approach and available treatment options. Data were also collected from operation notes and postoperative follow-up records.

Reconstructive surgery was performed following team discussions that included the patient's family. Post-surgical considerations included assessment of physical health, quality of life, psychological support, social support and rehabilitation. The study was carried out at selected pediatric surgery centers in Dhaka, Bangladesh.

3.1. Inclusion criteria

All surgically correctable birth defects patient admitted in Neonatology and Pediatric Surgery Department of BSMMU.

3.2. Exclusion criteria

- Birth defects which are not surgically correctable.
- Patient already received treatment at least once.
- Patient not giving consent

3.3. Statistical analysis

Data collected in predefined data collection form and was entered in SPSS. The analysis of the study was descriptive in nature, and findings were presented using frequencies, percentages, and mean values. Main result was the incidence and prevalence of birth defect, possibility of surgical correction and post-surgical outcome.

3.4. Data analysis

After collection in predefined data sheet, the data entered into a personal computer and was edited, analyzed and was plotted in tables. Lots of follow up patient's data was addressed by multiple imputation method. The data was analyzed using the statistical package for social sciences (SPSS) version 20.0. For Windows.

3.5. Ethical consideration

All information preserved by the author. No information disclosed without permission of the

patient. Informed consent – Before enrollment written informed consent was taken. This research was conducted after ethical approval of IRB of BSMMU.

4. RESULTS

Table 1. *Demographic Characteristics of our Study Participants (N = 150)*

Variables		Number	Percentage (%)
Age		3.14±3.39	
Gender	Male	101	67.33
	Female	49	32.67
Family history	Yes	21	14.00
	No	127	84.67
NICU need	Yes	67	44.67
	No	83	55.33
Stoma need	Colostomy	20	13.33
	No	129	86.00
	Suprapubic cystostomy	1	0.67
Hospital stay	Hospital stay (days)	9.21±3.81	
Nutritional status	Normal	94	62.67
	Moderate	7	4.67
	Malnutrition	45	30.00

Table 1 presents the demographic characteristics of our 150 study participants, with a mean age of 3.14±3.39 years. The majority were male (67.33%), while females comprised 32.67%. A family history of congenital defects was noted in 14% of cases. NICU admission was required for 44.67% of participants. Surgical interventions included colostomy (13.33%) and suprapubic cystostomy (0.67%), while 86% did not require a stoma. The mean hospital stay was 9.21±3.81 days. Regarding nutritional status, 62.67% were normal, while 30% had malnutrition and 4.67% had moderate nutritional deficiency.

Table 2. *Antenatal checkup of Mother*

Antenatal checkup	Number	Percentage (%)
Anemia	60	40.00
Jaundice	27	18.00
Viral fever	11	7.33
Diabetes mellitus	8	5.33
UTI	7	4.67
HTN	6	4.00
Thalassemia	5	3.33
Preëclampsia	4	2.67
ASD	3	2.00
Antipsychotic drug	2	1.33
Appendicitis	1	0.67
Pneumonia	1	0.67
Asthma	1	0.67
Cystitis	1	0.67
Depression	1	0.67
Phimosis	1	0.67
Polyhydromnios	1	0.67
Obesity	1	0.67
Colelethiasis	1	0.67
CSOM	1	0.67

Table 2 presents the antenatal health conditions of the mothers in our study. Anemia (40%) was the most common condition, followed by jaundice (18%), viral fever (7.33%), diabetes mellitus (5.33%) and urinary tract infection (4.67%). Other conditions, including hyperten sion (4%), thalassemia (3.33%), preeclampsia (2.67%) and atrial septal defect (2%), were less

frequent. A small proportion of mothers had a history of antipsychotic drug use (1.33%), appendicitis, pneumonia, asthma, cystitis, depression, phimos is, polyhydramnios, obesity, cholelithasis and CSOM (each 0.67%).

Table 3. *Antenatal fetal Diagnosis*

Category	Number	Percentage (%)
Congenital Anomalies	40	26.7
No Diagnosis (NAD)	110	73.3
Total	150	100

Table 3 presents the antenatal fetal diagnosis of our study participants. Congenital anomalies were detected in 26.7% of cases, while the majority (73.3%) had no abnormalities diagnosed during the antenatal period.

Table 4. *Urinary and fecal problems, scar status, albumin levels, physical health improvement and types of defect correction*

Urinary problem	Number	Percentage (%)
Wet of thigh	26	17.33
Dribbling	6	4.00
Low flow	1	0.67
Wet of perineum	2	1.33
UTI/Recurrent UTI	33	22.00
Yellow color urine	13	8.67
Urinary Incontinence	7	4.67
NAD	62	41.33
Fecal problem		
Constipation	18	12.00
Incontinence	5	3.33
Pale stool	12	8.00
Fecal soiling	3	2.00
NAD	112	74.67
Status of scar		0.00
Acceptable	136	90.67
Ugly	7	4.67
Keloid	4	2.67
Stenosis	2	1.33
Residual chordee	1	0.67
Albumin: level g/dl		
Mean ± SD, range (2.1 to 4.9)	3.64±1.00	
Improve Physical Health		
Yes	120	80.00
No	30	20.00
Types of correction of defect		
Single	110	73.33
Multiple	40	26.67

Table 4 presents data on various urinary and fecal problems, scar status, albumin levels, physical health improvement and types of defect correction. The most common issue reported is recurrent urinary tract infections (UTI) at 33%, followed by wetting of the thigh (26%) and yellow-colored urine (13%). Other concerns include urinary incontinence (7%), dribbling (6%), low flow (1%) and wetting of the perineum (2%). A significant portion (62%) had no abnormal findings (NAD). Among all fecal problems, constipation (18%) was the most frequently reported issue, followed by pale stool (12%), fecal incontinence (5%) and fecal soiling (3%). However, the majority (112 individuals) reported no abnormal findings (NAD). Most scars were considered acceptable (136 cases), while some were described as ugly (7 cases), keloid (4 cases), or stenotic (2 cases). There was one case of residual chordee. The mean albumin level was 3.64± 1.00g/dL, ranging from 2.1 to 4.9 g/dL. Physical Health Improvement was shown

in 120 individuals (80%) while 30 individuals (20%) did not experience improvement. The majority (73.33%) underwent a single correction procedure, while 40 individuals (26.67%) required multiple corrections.

Table 5. *Diagnosis*

Diagnosis	Number	Percentage (%)
Distal penile hypospadias/with mild chordee	7	4.67
Penoscrotal hypospadias with severe chordee	7	4.67
Coronal hypospadias	19	12.67
Vestibular anus	3	2.00
Proximal penile hypospadias with mild/moderate/severe chordee	6	4.00
Hirschsprung's disease	11	7.33
Cleft soft palate	9	6.00
Meningocele/Lumbosacral lipomyelomeningocele	11	7.33
Sacrococcygeal teratoma	2	1.33
Choledochal malformation type IV	2	1.33
Left sided non palpable UDT	3	2.00
Proximal penile hypospadias	5	3.33
CDH	2	1.33
Biliary atresia	8	5.33
Choledochal malformation type I	7	4.67
Vaginal atresia	2	1.33
Congenital hydrocephalus	3	2.00
Left sided gross HDN due to PUJO	2	1.33
Branchial sinus	2	1.33
Rt sided HDN due to PUJO	5	3.33
Others	17	11.33

Table 5 presents the distribution of diagnoses among our study participants. The most common conditions included coronal hypospadias (12.67%), Hirschsprung disease (7.33%), Meningocele/ lumbosacral lipomyelomeningocele (7.33%) and cleft soft palate (6%). Other notable diagnoses were biliary atresia (5.33%), distal penile hypospadias (4.67%), Choledochal malformation type I (4.67%) and proximal penile hypospadias (4%). Less frequent conditions included sacrococcygeal teratoma, congenital hydrocephalus, vaginal atresia and PUJO-related hydronephrosis. Additionally, 11.33% of cases fell into the 'Others' category, representing various rarer congenital anomalies.

Table 6. *Name of Operation*

Name of Operation	Number	Percentage (%)
Repair of hypospadias	35	23.33
Cystoscopic fulguration	1	0.67
Anoplasty	4	2.67
Laparotomy	32	21.33
Palatoplasty	10	6.67
Excision of cyst and Roux-en-Y hepaticojejunostomy	4	2.67
Transanal pull through	10	6.67
Splenectomy	5	3.33
Left sided A-H pyeloplasty	4	2.67
Rt sided A-H pyeloplasty	4	2.67

Table 6 presents the types of surgical procedures performed in our study. The most common operation was hypospadias repair (23.33%), followed by excision & repair (21.33%). Other frequently performed procedures included palatoplasty (6.67%), transanal pull-through (6.67%) and splenectomy (3.33%). Additionally, anoplasty, hepaticojejunostomy and pyeloplasty were performed in smaller proportions. Cystoscopic fulguration (0.67%) was the least common procedure.

Table 7. *Postoperative Complications*

Complication	Number	Percentage (%)
No Complications (NAD)	102	68.0
Urinary Complications (e.g., UC fistula)	11	7.3
Surgical Site Infection (SSI)	3	2.0
Liver-related Issues (e.g., cirrhosis)	2	1.3
Other Complications	35	23.3

Table 7 presents the postoperative complications observed in our study. The majority of patients (68%) had no complications. Urinary complications, such as urethrocutaneous fistula, occurred in 7.3% of cases, while surgical site infections (2.0%) and liver-related issues (1.3%) were less frequent. Additionally, 23.3% of patients experienced other complications, highlighting the diverse range of postoperative challenges.

Table 8. *Anemia and Jaundice*

Variable	Category	Number	Percentage (%)
Anemia	Yes	60	40.0
	No	90	60.0
Jaundice	Yes	27	18.0
	No	123	82.0

Table 8 presents the distribution of anemia and jaundice among study participants. Anemia was present in 40% (n=60) of cases, while 60% (n=90) had no anemia. Similarly, jaundice was observed in 18% (n=27) of participants, whereas 82% (n=123) did not have jaundice.

5. Discussion

This prospective study assessed surgically correctable congenital anomalies among 150 pediatric patients aged 0–18 years in Bangladesh, providing valuable insights into demographic, clinical and surgical patterns. The mean age of our participants was 3.14 ± 3.39 years and males predominated (67.33%), consistent with the findings of Hagander et al., who also reported male preponderance in pediatric surgical admissions in Bangladesh [10]. The higher male proportion may be linked to sociocultural preferences and gender-based healthcare-seeking disparities, as described by Chowdhury et al., who highlighted gender bias in the referral and management of pediatric surgical conditions [11].

Antenatal detection of congenital anomalies in our study population was relatively low (26.7%), suggesting limitations in prenatal diagnostic facilities and maternal health surveillance. This rate is comparable to that reported by Zaputovic et al., who found that many surgically correctable anomalies in low-resource settings are missed during routine ultrasonography [12]. The WHO, report on birth defects in South-East Asia also identified poor antenatal screening coverage as a major contributor to delayed diagnosis and preventable morbidity [13]. Strengthening prenatal imaging and maternal education could therefore enhance early detection and timely referral for corrective intervention.

Maternal anemia (40%) was the most prevalent antenatal condition in our study, followed by jaundice (18%) and viral infections (7.33%). These findings parallel those of Singh and Gupta, who emphasized that maternal anemia and infections are key risk factors for congenital malformations in developing countries [14]. The presence of diabetes mellitus and preeclampsia in a subset of mothers further supports the multifactorial etiology of congenital anomalies, as highlighted by Anyanwu et al., in a Nigerian cohort. These maternal conditions can compromise fetal development through hypoxia, placental insufficiency, or teratogenic effects [15].

In our series, the most frequent anomalies were coronal hypospadias (12.67%), Hirschsprung disease (7.33%), meningocele/lumbosacral lipomyelomeningocele (7.33%) and cleft soft palate (6%). Similar distributions were observed by Soomro in Pakistan and Biri et al., in Turkey, where genitourinary and gastrointestinal anomalies represented the majority of surgically correctable defects [16, 17]. Hypospadias repair was the most common surgical procedure performed (23.33%), followed by excision and repair (21.33%), palatoplasty (6.67%) and transanal pull-through (6.67%). The predominance of

these procedures underscores the ongoing burden of congenital anomalies requiring specialized pediatric surgical care in South Asia.

Postoperative complications were encountered in 32% of patients, with urethrocutaneous fistula being the most frequent (7.3%). Despite these complications, 80% of patients showed physical health improvement after surgery. Rato et al., similarly reported favorable long-term outcomes in children following corrective surgeries for congenital anomalies when multidisciplinary perioperative care was ensured [18]. The low postoperative mortality in our series aligns with findings by Farmer et al., who noted that with proper perioperative support, survival rates after congenital anomaly surgery can approach those in high-income settings [19].

Nutritional status played a crucial role in recovery outcomes. In our study, 62.67% of children had normal nutrition, whereas 30% were malnourished. Malnutrition has been identified as a major determinant of postoperative complications and prolonged hospital stays in low-income countries [11]. The mean hospital stay in our cohort was 9.21 ± 3.81 days, which is consistent with the findings of Hagander et al., indicating comparable postoperative recovery durations in tertiary Bangladeshi centers [10].

Only 26.67% of patients required multiple corrective surgeries, while most achieved satisfactory outcomes after a single operation. This is comparable to findings by Onalo and Osagie, who observed that prompt diagnosis and multidisciplinary planning improve the likelihood of achieving definitive correction in a single surgical stage [20]. The use of imaging and chromosomal analysis in selected cases also aided in accurate diagnosis and individualized surgical planning, consistent with the recommendations by Sayed et al., regarding MRI's role in anorectal malformation evaluation [21].

Overall, our findings emphasize that surgically correctable congenital anomalies remain a significant but manageable health challenge in Bangladesh. Consistent with WHO, surveillance data, congenital anomalies account for a substantial portion of neonatal morbidity but can achieve good functional outcomes with early diagnosis, timely intervention and comprehensive postoperative care [22]. The combination of improving prenatal screening, optimizing maternal health and strengthening pediatric surgical infrastructure is essential to further reduce the burden of congenital anomalies in resource-limited settings.

6. Limitations of the Study

The study was conducted in a single tertiary care center with a limited sample size, which may not fully represent the national scenario. Additionally, long-term follow-up data on functional and psychosocial outcomes were not uniformly available, which may have affected the assessment of complete rehabilitation and quality-of-life improvements.

7. Conclusion

This study highlights that timely diagnosis, comprehensive evaluation and multidisciplinary surgical management play a crucial role in improving survival, functional outcomes and quality of life among children with congenital anomalies. Most patients showed significant postoperative recovery with minimal complications, emphasizing the effectiveness of well-coordinated pediatric surgical care supported by psychological and social counseling.

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Conflicts of Interest

There are no conflicts of interest.

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