

Disease pattern and outcome of bilious vomiting due to congenital abnormalities in a cohort of Sri Lankan neonates: experience from a newly established paediatric surgical unit

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Introduction

Bilious vomiting in neonates is a salient clinical feature of congenital anatomical intestinal obstruction. Causative pathologies include; malrotation of midgut (1:6000 live births), duodenal atresia (1:5000 live births), spectrum of jejuno-ileal atresias and congenital intestinal bands [1,2,3]. Delayed intervention would cause ischaemia, necrosis and perforation of gut. Persistent vomiting leads to dehydration and metabolic derangement resulting in shock and, aspiration pneumonia [1,2]. Encounters of such delays in diagnosis and management are not rare during our practice.

According to literature, majority of research on this subject have analysed already documented data on neonates managed by multiple clinicians other than the researches [4,5,6]. The uniformity in interpretation of clinical features and management may be questionable in some of them. Some studies have included neonates with acquired pathologies such as necrotising enterocolitis. Self analytical research on neonates with bilious vomiting due to congenital anatomical abnormalities managed by the researchers themselves are rare.

Study period in majority of research on this subject ranges between 12 months to 24 months hence, this research was conducted over 18 months to enable comparison. Study setting was the pioneering neonatal surgical unit managed by a single paediatric surgeon at the two Special Care Baby Units (SCBUs) of Colombo North Teaching Hospital Ragama (CNTH). This unit is the tertiary care neonatal referral centre for Sri Lanka's most densely populated Gampaha District. The unit caters to Sri Lanka's largest Foetal Medicine and Maternity Unit managing pregnant mothers with antenatal

concerns attached to CNTH.

All neonates were surgically managed by the first author as per the surgical guidelines [7,8,9] and, cared for at the two SCBUs lead by second and third authors. All radiological studies were supervised by fourth author while fifth author was involved in post operative follow up.

Material and methods

Ethical and Administrative clearances were obtained from Sri Lanka College of Paediatricians and Ministry of Health Sri Lanka respectively. All neonates with bilious vomiting due to congenital anatomical intestinal obstruction born from 2023.08.01 to 2025.01.31 were included in the study. All aspects of events related to pathology: from antenatal period until the end of neonatal period were analysed. The analysed birth details included; period of gestation (POG), birth weight (BW) and, mode of delivery whether normal vaginal delivery (NVD) or Caesarian section (CS) under elective (EI) or emergency (Em)) settings. The risk factors studied included those involving both mother and the baby. Evidence for intestinal obstruction at presentation included results of antenatal Ultrasound Scans (Ante. USS) and clinical features observed after birth. The age at identifying bilious vomiting, radiological diagnosis, surgical findings, type of surgery, post operative events and outcome at the end of neonatal period were also analysed. X-ray abdomen was diagnostic in duodenal atresia, jejunal atresia, ileal atresia and congenital bands. Malrotation and jejunal stenosis were diagnosed using upper gastro-intestinal contrast studies.

Results

Fifteen neonates were included in the analysis. Analysis according to pathology follows. Three malrotations of midgut (Mal), eight duodenal atresias (DA) and one each of jejunal atresia (JA), jejunal stenosis (JS), ileal atresia (IA) and congenital intestinal bands (CB). Six of them (40%) were female. On studying their birth related data, 10/15 (66.6%) were found to be born pre-term. Their gestational age ranged from 28/52 to 38/52 with a mean of 34.23/52. Twelve (80%) had low birth weight <2.5kg. The birth weight ranged from

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1.17kg to 2.9kg with a mean of 2.25kg. All neonates except one was born at one of the three obstetric units attached to the hospital.

All except the three neonates with malrotation and jejunal stenosis were diagnosed on having bilious vomiting within first 72 hours of birth. The three with malrotations (Mal 1 to 3) presented with bilious vomiting at the ages of 10, 21 and 8

days respectively. Only 13 babies (86.7%) were stable to undergo general anaesthesia. All were managed at the SCBU from the time of diagnosis until discharge. Enteral feeding was commenced by fifth day after surgery in all stable neonates. Post-operative survival rate of 13 operated neonates at day five was 84.6%. Sepsis affected 80% of neonates leading to a mortality rate of 46.7%. Survival rate one month after surgery was 53.3%.

No	Birth details & risk factors	Sex	Age at bilious vomiting	Surgery details	Post-op Events	Outcome at 1 month
Mal 1	Term, 2.9kg NVD	Male	10 days	Laparotomy, Ladd's procedure. Had ischaemic midgut	Sepsis & shock	Good
Mal 2	Term, 2.6kg NVD Treated for sepsis at referring hospital	Female	21 days	Laparotomy, Ladd's procedure	None	Good
Mal 3	Term, 2.4kg El CS-for bad past obstetric history	Male	8 days	Laparotomy, Ladd's procedure	Sepsis	Good
DA1	POG 34/52, BW 1.17kg NVD	Female	Day 2	Laparotomy & duodeno-duodenostomy	Sepsis, hyperbilirubinaemia	Good
DA2	POG 33/52 BW 1.8kg. NVD. Down's syndrome	Male	Day 3	Laparotomy & duodeno-duodenostomy	Septicaemia	Expired day 9
DA3	POG 28/52, BW 2.1kg. NVD. Severe congenital heart disease	Male	Day 2	Not operated Unstable baby	-	Expired Day 3
DA4	POG 33/52 BW 2.3kg. NVD. Maternal substance abuse, syndromic baby	Male	Day 2	Laparotomy & duodeno-duodenostomy	Septicaemia	Expired Day 8
DA5	POG 33/52 BW 2.1kg. Em CS in elderly primi mum. Down's syndrome	Male	Day 2	Laparotomy & duodeno-duodenostomy	Septicaemia	Expired Day 5
DA6	Term, 2.4kg. El CS for unstable foetal position	Female	Day 1	Laparotomy & duodeno-duodenostomy	None	Good
DA7	POG 28/52, BW 2.1kg. NVD. Major congenital anomalies	Female	Day 1	Not operated Unstable baby	-	Expired Day 2
DA8	Term, BW 2.3kg. NVD. Maternal pyrexia	Male	Day 2	Laparotomy & duodeno-duodenostomy	Septicaemia	Expired Day 5
JA1	POG 34/52, BW 2.36 kg. NVD. Diabetic mum. Meconium aspiration. Congenital heart disease	Male	Day 1	Laparotomy & tapering jejuno-jejunostomy	Sepsis, heart disease	Recovering
JS1	Term, BW 2.54kg. NVD.	Female	Day 8	Laparotomy & jejuno-jejunostomy	Sepsis. Adhesive intestinal obstruction	Recovering
IA1	POG 35/52, BW 2.43kg. NVD.	Male	Day 2	Laparotomy & ileo-ileostomy for IA type III b (apple peel type)	Sepsis	Good
CB1	POG 28/52, BW 2.3kg, Em CS for maternal hypertension	Female	Day 2	Laparotomy, division of congenital bands & repair of sealed bowel perforation	None	Good

Discussion

This study on neonates with bilious vomiting analysed birth related data, clinical and radiological evidence, type of surgery and surgical findings, post operative events and outcome at the end of the neonatal period. Since establishment of neonatal surgical services in the hospital, the researches practised small group discussions with the obstetric teams promoting antenatal screening for gut anomalies. As a result dilated bowel was identified in 2 foetuses with duodenal atresia. This finding helped in avoiding breast feeding at birth minimising gut colonisation while facilitating early intervention. Similarly, small group discussions were held for medical and nursing staff attached to SCBUs and paediatric wards of the hospital on clinical features and standard management protocols of neonates with bilious vomiting.

Radiological investigations were commenced with supine x-ray abdomen. Those with duodenal, jejunal and ileal atresias had diagnostic radiological features of the respective pathologies. X-ray abdomen in jejunal stenosis and malrotation of midgut were inconclusive and therefore upper gastrointestinal contrast studies were performed to arrive at respective diagnosis. All stable neonates underwent standard laparotomy within 24 hours of radiological diagnosis.

On analysing findings at surgery, the need to prevent delay in seeking professional medical care as seen with Mal 1 was identified. First author had therefore conducted educational programmes for general practitioners and health care workers in the region of the hospital. Educational programmes with stakeholders in wider forums is required to make a better impact.

Neonates with duodenal atresias are known to have associated congenital anomalies and complex post-operative recovery period¹⁰. All eight neonates with duodenal atresias had low birth weight while seven of them were born pre-term. Only 6/8 (75%) were stable to undergo duodeno-duodenostomy. All six survived for more than five days after surgery. All five pre-term babies with DA contacted sepsis. The prematurity, low birth weight and associated syndromes may have contributed to low immunity in combatting sepsis. Antenatal diagnosis of is valuable in planning supportive care and management since birth as evident in the DA 6 baby born at term with antenatal diagnosis of dilated stomach undergoing timely surgery followed by an uneventful recovery. Maternal illnesses such as non-optimised diabetes mellitus and substance abuse and, perinatal adverse events such as maternal pyrexia with dribbling and meconium aspiration at birth would

compromise the immunity of the neonate.

Sepsis was identified as the major culprit for morbidity and mortality in this cohort population made of majority pre-term and low birth neonates undergoing complex surgical reconstructions. Following this study, series of multi-disciplinary meetings to combat sepsis under supervision of the microbiology team were conducted. Small group educational discussions on diagnosis and management of neonates with bilious vomiting for stakeholders at the hospital were continued. Researches intend to educate stakeholders on the management of neonates with bilious vomiting in wider forums in the near future utilising results of this study.

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Learning Points:

- Bilious vomiting in neonates must be investigated to look for congenital anatomical intestinal obstruction
- Timely recognition of bilious vomiting, resuscitation and radiological diagnosis facilitates surgical outcome