SLHD: Royal Prince Alfred Hospital Guideline

Bilious Vomiting in the Term Neonate	
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Contents

Bilious Vomiting in the Term Neonate

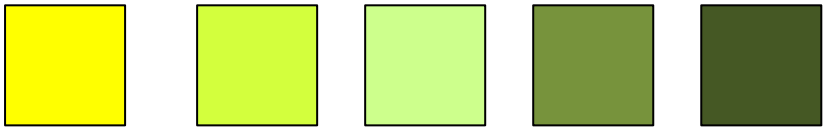
1. Introduction

Bilious emesis is defined as the presence of green or fluorescent yellow[1], bile-containing material within vomitus.

Bilious vomiting is pathologic and considered a sign of intestinal obstruction until proven otherwise. It is a time critical diagnosis as unrecognised bowel obstruction with vascular occlusion can result in intestinal ischaemia and rapid systemic compromise within hours.[2]

The presence of a bile-stained vomit is thus considered a surgical emergency, and requires urgent investigation and management. All term neonates with bilious vomiting require transfer to a tertiary surgical centre for an upper gastrointestinal contrast study and surgical review.

Figure 1. Spectrum of bilious vomit colours



Key Points

- Bilious vomiting in term neonates requires urgent action
- 20-50% of these patients have underlying surgical pathology[3,4,5,6]
- Admit babies immediately to NICU/HDU
- Early notification of NICU on call Consultant/Fellow
- Whilst arranging transfer to surgical unit
    - Stabilise with airway/blood pressure support and fluid resuscitation if required
    - Nil by mouth
    - Placement of an 8F gastric decompression tube
    - Cannula with venous blood gas/blood culture/FBC/EUC
    - Consider broad-spectrum antibiotics to cover for differential of sepsis
    - Abdominal x-ray

2. The Aims / Expected Outcome of this Guideline

- Early identification of neonates with bilious vomiting
- Implementation of an appropriate, timely management strategy
- Prompt consultation with NETS (NSW Newborn and Paediatric Emergency Transport Service).

3. Risk Statement

SLHD Enterprise Risk Management System (ERMS) Risk # 106 - Recognising and Responding to Clinical Deterioration in Acute Health Care

- Delayed recognition or response to bilious vomiting can result in catastrophic gastrointestinal and systemic complications, including death

4. Scope

- Medical and nursing staff in RPA Newborn Care
- Medical and midwifery staff in delivery and postnatal wards

5. Implementation

- Guideline available on RPA Newborn Care Medical Guidelines internet page and SLHD Intranet
- Distribution of guideline via email to unit staff
- Education for nursing staff, medical officers and neonatal nurse practitioners, including during orientation

6. Guidelines

6.1 Background

Bilious vomiting suggests obstruction at the level of or distal to the ampulla of Vater in the descending duodenum.

20-50% of neonates with bilious emesis have underlying surgical pathology.[3,4,5,6], which is consistent with Australia data.[7,8]

The incidence of bowel obstruction in neonates is estimated to be 1 in 2000.[9] The risk of vascular compromise most notably occurs in the setting of malrotation with volvulus. This can result in short gut syndrome and/or death.

6.2 Aetiology

A variety of surgical pathology can cause early intestinal obstruction in the neonatal period.

Table 1. Causes of Bilious Vomiting

Surgical Causes	Non-Surgical Causes
Malrotation with midgut volvulus	Septic ileus
Intestinal atresia- duodenal/jejunoileal/colonic	GORD
Intestinal perforation	Gastric dysmotility
Meconium ileus	Urogenital anomalies
Meconium plug syndrome	Idiopathic
Necrotising enterocolitis	
Hirschsprung's Disease	
Anorectal malformation	
Rarely- duodenal webs, duplication cysts, annular pancreas, adhesions, inguinal herniae	

Intestinal Malrotation: abnormal embryologic bowel rotation resulting in a narrow mesenteric root.[10] This predisposes to volvulus, whereby the midgut twists on its mesentery, and can occlude the superior mesenteric vessels. Extensive intestinal necrosis can develop within 6 hours of onset of volvulus.[11] Malrotation has an incidence of 1 in 500-2500 live

births[1,12] and accounts for up to 15% of neonatal bilious vomiting cases.[5,6] The presence of malrotation, with or without volvulus, warrants an urgent Ladd's procedure for surgical fixation. Midgut volvulus carries a mortality rate of 10%.[13]

Intestinal Atresia: atresia can occur at any intestinal level and is responsible for up to 13% of neonatal bilious emesis.[5,6] Duodenal atresia occurs in 1 in 5000 neonates[2] and is hypothesized to be caused by villous hypertrophy antenatally.[11] The pathognomonic gastric 'double bubble' sign and polyhydramnios are red flags. Jejunoileal and colonic atresias are usually due to vascular accidents in utero.[2]

Meconium Ileus: intestinal obstruction from thick tenacious meconium, usually in the ileum. Incidence of 1 in 3000 live births.[7] Meconium ileus is pathognomonic for Cystic Fibrosis.

Meconium Plug Syndrome: obstruction due to an inspissated plug of meconium, usually in the distal colon. It is likely caused by inadequate peristalsis from an immature myenteric nervous system.[14]

Necrotising Enterocolitis: a disorder of intestinal inflammation, ischaemia and bacterial translocation that predominantly affects premature neonates. Further details of this condition and its treatment are available in the RPA Newborn Care Necrotising Enterocolitis policy.[15]

Hirschsprung's Disease: aganglionosis of the rectum ± colon. Incidence of 1 in 5000 live births.[11] This usually presents in the first few days with delayed passage of meconium and signs of obstruction. Diagnosis is via rectal suction biopsy.

Anorectal Malformation: all neonates should be examined in the delivery room to ensure a normally sited and patent anus. Anorectal malformations require urgent surgical correction.

Sepsis: functional bowel obstruction due to sepsis is a well-recognised cause of bilious vomiting. This is a diagnosis of exclusion, and based on additional clinical and laboratory evidence of infection.

6.3 Diagnosis

History Taking: pertinent information that should be sought includes

- Clarification of the vomit colour (ideally with direct visualisation) and any prior episodes
- Feeding assessment
- Stooling habits- time to first passage of meconium, frequency, colour
- Antenatal imaging- specifically any morphologic abnormalities or presence of polyhydramnios
- Risk factors for early onset sepsis
- Risk factors for NEC

Clinical Examination:

- Examine for evidence of respiratory compromise
- Assessment of fluid status and perfusion
- Thorough abdominal examination- distension, whether tense, quality of bowel sounds
- Inspection of groin to exclude an inguinal hernia
- Confirm patent anus

In general, a profoundly distended abdomen suggests more distal obstruction.[14] Both distension and tenderness are predictors of surgical pathology.[16]

Neonates can initially present deceptively well with intestinal obstruction- a normal examination does not exclude evolving ischaemia.

6.4 Investigations

Abdominal X-ray: an abdominal x-ray should be performed urgently for all neonates with bilious emesis. It has a sensitivity of 85% in detecting surgical pathology with a specificity of 54%.[16] A normal x-ray does not exclude intestinal obstruction, including malrotation. Malhotra et al[7] found that 50% of neonates with bilious vomiting from a surgical cause were reported to have normal or non-specific findings on abdominal x-rays.

Abdominal Ultrasound: despite extensive research, ultrasound is an unreliable diagnostic tool for neonatal bilious vomiting and should not be routinely performed for this indication. Its sensitivity in detecting malrotation is 75% and specificity specificity 80%[17], with a false negative rate of 13%.[18]

Upper GI Contrast Study: this is the gold standard imaging modality for detecting malrotation. The hallmark signs are an abnormally positioned duodenojejunal junction to the right of the spine[19] and inferior to the duodenal bulb[20], and/or a corkscrew course[21] of the contrast as it travels anteriorly through volved bowel. The upper GI contrast study has a sensitivity of 96% and specificity of 33%[22] for identifying malrotation.

Upper GI contrast studies are not performed at RPA Hospital. All patients require transfer to a tertiary surgical site for this investigation.

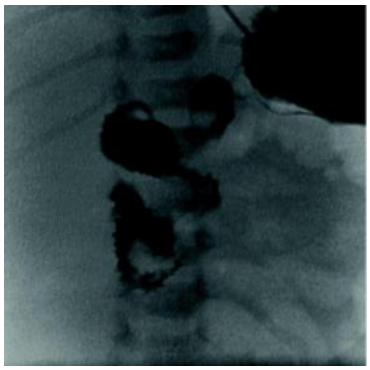


Figure 3. Malrotation and volvulus with corkscrew pattern. Reproduced from: Shalaby MS, Kuti K, Walker G. Intestinal Malrotation and Volvulus in Infants and Children. BMJ 2013 Nov;347:f6949[12]

6.5 Management

The objectives are to stabilise the neonate and arrange urgent transfer to a surgical centre for further assessment.

6.6 Initial Measures

- If the baby is on the postnatal ward, admit to NICU/HDU. These babies cannot be admitted to the Special Care Nursery
- Monitor with continuous cardiorespiratory monitoring
- Evaluate for features of hypovolaemia or shock and treat accordingly
- Early notification of the on call fellow/consultant

6.7 Investigations

- Insert a peripheral cannula and send blood for culture, venous gas, FBC and electrolytes
- Urgent abdominal x-ray

6.8 Bowel rest

- Cease enteral feeds
- Gastric decompression with a large bore 8F orogastric tube
- Monitor gastric output. Consider replacing losses >20ml/kg/day

6.9 Fluids

- Consider intravenous fluid resuscitation with crystalloid therapy if hypovolaemia suggested by haemodynamic status, perfusion or raised lactate
- Commence maintenance intravenous fluids- 10% dextrose if less than 24 hours of age, otherwise 0.225% NaCl + 10% dextrose if over 24 hours
- Correct electrolyte imbalances. Biochemical disturbance is more likely in more proximal bowel obstruction
- Monitor urine output. Consider urinary catheterisation if hypovolaemic or shocked

6.10 Intravenous Antibiotics

Consider commencing broad-spectrum empiric antibiotics with anaerobic coverage to cover for the possibility of sepsis. The recommended antibiotic regimen at RPA Newborn Care for bilious vomiting is a single dose of piperacillin/tazobactam (Tazocin).

6.11 Other

- Consider whether analgesia is required
- Update parents about progress and plans
- Notify Obstetric team

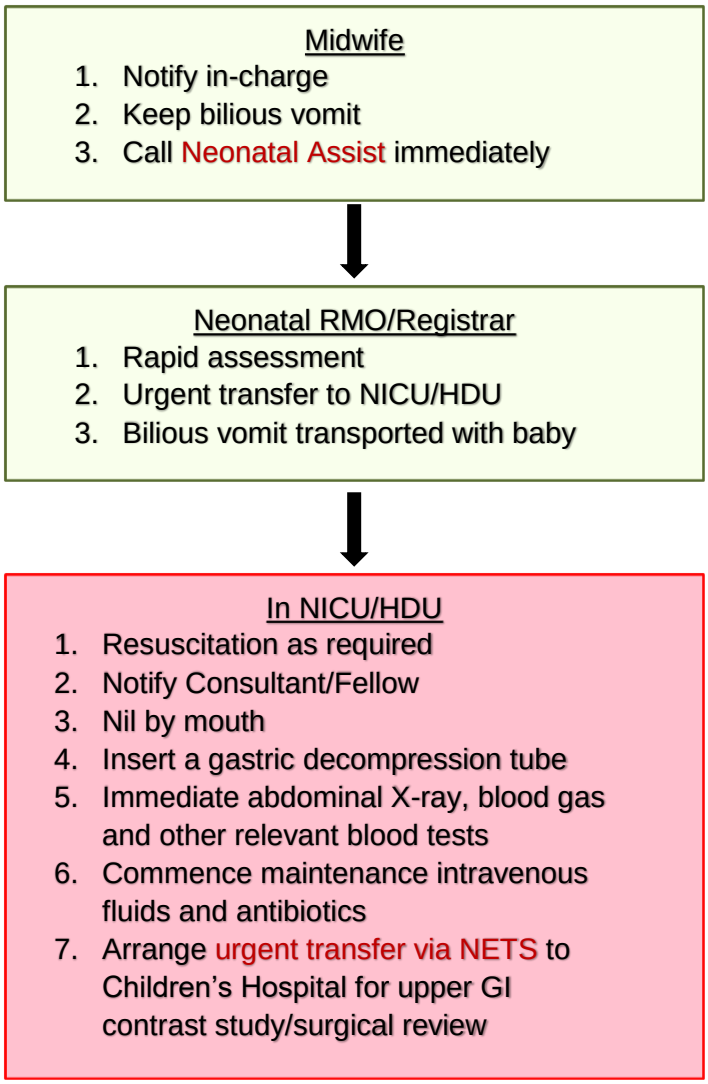
6.12 Transfer out of RPA Newborn Care

All neonates with bilious emesis require urgent transfer to a Children's Hospital for surgical review and an upper GI contrast study. This must be coordinated through NETS. In select circumstances where there may be a delay to transfer of a well neonate, RPA Newborn Family Support transport may be appropriate.

In most circumstances it is appropriate to refer directly to NETS. If the clinical scenario is less clear, discussion with the on call Paediatric Surgeon for RPA Newborn Care should occur.

Unstable neonates require a plan for appropriate respiratory and/or circulatory support to facilitate safe transfer, in consultation with NETS. Ensure parents remain appropriately updated and consider maternal transfer if available.

Figure 4. Approach to the bilious vomit on the postnatal ward



6.13 Transfer back to RPA Newborn Care

Neonates with a normal upper GI contrast study and resolution of bilious emesis will usually be transferred back once cleared by the surgical team. On arrival back to RPA Newborn Care, the management priorities include

- Establishment of enteral feeds
- Completion of intravenous antibiotic course if required
- Close observation for further abdominal concerns

If ongoing suspicion for surgical pathology, rediscuss with Paediatric Surgery for consideration of further investigations, such as a laparoscopy.

7. Definitions

NETS	NSW Newborn and Paediatric Emergency Transport Service
GORD	Gastro-oesophageal reflux disease
GI	Gastrointestinal
EUC	Electrolytes, urea and creatinine
FBC	Full Blood Count/Evaluation

8. Consultation

RPA Newborn Care Research/Guidelines Meeting
RPA Paediatric Surgical VMOs- Drs Karpelowsky, Langusch, La Hei and Russell
Dr Rebecca Davis (Consultant Physician in Infectious Diseases)

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9.1 National Safety and Quality Health Service (NSQHS) Standards, 2nd Edition


Clinical Governance Standard


Comprehensive Care Standard


Communicating for Safety Standard


Recognising and Responding to Acute Deterioration Standard