

Bilious Vomiting in the Newborn: How Often Is It Pathologic?

By Prasad Godbole and Mark D. Stringer
Leeds, England

Background/Purpose: Intestinal obstruction is one of the most common reasons for admission to a neonatal surgical unit and frequently is manifest by bilious vomiting. Not all cases of neonatal bilious vomiting are caused by intestinal obstruction. This study aimed to investigate the outcome of neonates with bilious vomiting.

Methods: A prospective audit was undertaken of all neonates with a history of bilious vomiting referred to a regional pediatric surgical unit during a 2-year period (1998 to 2000). Infants with bilious nasogastric aspirates but no vomiting were not included. Demographic details, symptomatology, investigations, and final diagnoses were recorded. Subsequent clinical progress was ascertained by out-patient review or telephone interview.

Results: Sixty-three consecutive neonates (35 boys, 28 girls) were identified with a median gestational age of 40 (range 31 to 42) weeks and median birth weight of 3.5 kg (range 1.67 to 4.64). Median age at presentation was 26 hours (range, 9 hr to 28 days). A surgical cause of bilious vomiting was identified in 24 (38%): Hirschsprung's disease (n = 9), small bowel

atresia (n = 5), intestinal malrotation (n = 4), meconium ileus (n = 3), meconium plug (n = 1), colonic atresia (n = 1), and milk inspissation (n = 1). Nineteen of these had both abdominal signs and an abnormal plain abdominal radiograph, and 4 had an abnormal abdominal radiograph only. In one infant with intestinal malrotation, clinical examination and plain radiography were unremarkable. After definitive surgery, all 24 infants were well at a median age of 14 (7 to 28) months. No surgical cause for bilious vomiting was found in 39 (62%) neonates whose symptoms resolved with conservative management.

Conclusions: These data emphasize the maxim that bilious vomiting in the newborn should be attributed to intestinal obstruction until proved otherwise. However, in this prospective audit, bilious vomiting was not caused by intestinal obstruction in 62% of cases, and most of these infants suffered no further sequelae.

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INDEX WORDS: Neonate, intestinal obstruction, vomiting.

INTESTINAL OBSTRUCTION is one of the most common causes of admission to a neonatal surgical unit, accounting for up to one third of all admissions.¹ In 1958, Orvar Swenson² stated that "In the neonatal period, vomiting of bile-stained material is almost invariably associated with intestinal obstruction" and this continues to be an important tenet of pediatric surgeons. Not all cases of bilious vomiting are caused by intestinal obstruction.^{1,3} There is only one previous report examining the outcome of neonates with bilious vomiting.³ We therefore undertook a prospective study to determine the fate of infants who presented with neonatal bile-stained vomiting.

MATERIALS AND METHODS

All neonates with a history of bilious vomiting referred to a regional pediatric surgical unit during a 2-year period (September 1998 to September 2000) were prospectively audited. Only infants with "green" vomiting witnessed by an experienced nurse, midwife, or doctor were included. Neonates with bilious nasogastric aspirates but no vomiting were not included. Demographic details, symptomatology, investigations, and final diagnosis were recorded. Routine clinical care remained unchanged during the study period. Clinical progress after hospital discharge was ascertained from routine out-patient follow-up visits or by parental telephone interview.

RESULTS

Sixty-three consecutive neonates (35 boys, 28 girls), in whom the dominant presenting feature was bilious vomiting, were identified. Their median gestational age was 40 weeks (range, 31 to 42) and birth weight was 3.5 kg (range, 1.67 to 4.64). Median age at presentation was 26 hours (range, 9 hrs to 28 days). Fifty were delivered vaginally (2 by forceps and 1 by ventouse extraction) and 13 by cesarian section. Forty-nine (78%) passed meconium within 24 hours of birth, and 11 of these had surgical pathology. Thirty-three were referred from peripheral neonatal units.

A surgical cause of bilious vomiting was identified in 24 neonates: Hirschsprung's disease (n = 9), small

From the Department of Paediatric Surgery, Leeds Teaching Hospitals NHS Trust, Leeds, England.

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Address reprint requests to M.D. Stringer, Department of Paediatric Surgery, Ward 11, Gledhow Wing, St James University Hospital, Beckett St, Leeds LS9 7TF, England.

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bowel atresia (n = 5), intestinal malrotation (n = 4), meconium ileus (n = 3), meconium plug (n = 1), colonic atresia (n = 1), and milk inspissation (n = 1). Nineteen of these had abdominal signs (eg, distension, tenderness, palpable bowel loops) and an abnormal plain abdominal radiograph. Four neonates had no abdominal signs but had an abnormal plain abdominal radiograph (duodenal atresia in 2, intestinal malrotation in 2). One neonate with bilious vomiting caused by intestinal malrotation confirmed by upper gastrointestinal contrast study had neither abdominal signs nor abnormalities on a plain abdominal radiograph. All 24 cases underwent definitive surgery in the neonatal period or early infancy. Of the 9 neonates with Hirschsprung's disease, 8 underwent a primary pull-through operation (Duhamel in 7 and Soave in 1) and 1 a staged pull-through procedure. All surgical infants were well at a median follow-up of 14 months (range, 7 to 28).

No surgical cause for bilious vomiting was found in 39 neonates, all of whom were born at ≥ 37 weeks' gestation and whose symptoms resolved with conservative management. Of these, 35 had a normal clinical examination and plain abdominal radiograph. Four had a distended abdomen and radiologic evidence of abnormally dilated bowel. Thirty-two were investigated with an upper gastrointestinal contrast study. Fifteen had evidence of gastroesophageal reflux (GER), which extended to the upper third of the esophagus in 7. An abdominal ultrasound scan was normal in all 14 cases examined. Four neonates underwent a suction rectal biopsy that showed no histologic abnormalities. All infants had negative blood and urine cultures. Follow-up at a median age of 15 months (range, 5 to 28) showed the following: 4 infants had persistent symptoms of GER, 2 of whom were being treated with antireflux medication; 3 infants were mildly constipated but had no evidence of Hirschsprung's disease; and 1 infant had been treated successfully for intussusception at the age of 7 months and was well. The parents of 1 child could not be contacted. Thus, 31 of 38 (82%) infants had no residual gastrointestinal symptoms over the period of follow-up.

DISCUSSION

This prospective study shows that bilious vomiting in the neonatal period is not invariably associated with intestinal obstruction. This was the underlying cause in 38% of our cases. In the only previously published study of bilious vomiting in the newborn, a similar proportion of neonates (31 of 45 [69%]) were found to have no obvious surgical cause and were categorized as having idiopathic bilious vomiting.³ This same study found no

correlation between delayed passage of meconium (>24 hr) and a surgical cause for bilious vomiting. In our series, passage of meconium after 24 hours occurred in 13 of 24 (54%) of the surgical group compared with only one (3%) of the nonsurgical neonates.

Although abdominal distension accompanied by an abnormal plain abdominal radiograph are strongly supportive of underlying surgical pathology, they are not necessarily diagnostic, and further imaging often is required.^{3,4} In our series, the diagnostic sensitivity and specificity of a plain abdominal radiograph in determining surgical pathology in neonates with bilious vomiting was 96% and 90%, respectively. Plain radiography frequently fails to provide a precise diagnosis. Surgical intervention based on plain radiography and clinical examination alone was carried out in only 6 of 24 neonates (25%), and most infants required additional investigations before surgery. Abdominal distension and dilated bowel were false-positive findings in 4 of 27 cases.

None of the neonates in our study had meconium-stained liquor. In such cases, the baby may not actually have passed meconium and the green discolored liquor is the result of bilious vomiting in utero secondary to intestinal obstruction.^{5,6} In babies with "meconium-stained liquor" a nasogastric tube should be inserted to assess the nature of the gastric content.⁶

What is the etiology of nonsurgical bilious vomiting? Gastroesophageal reflux and gastric dysmotility are common in newborn infants.^{7,8} A combination of gastroesophageal and duodeno-gastric reflux may account for some cases of bilious vomiting. Moderately severe GER to the upper third of the esophagus was seen in 7 nonsurgical neonates in our study. Functional intestinal obstruction and bilious vomiting also may occur secondary to metabolic disturbances and sepsis¹ but there were no examples of either in our series.

We strongly support the statement that "bilious vomiting in the [neonate] should be considered as due to mechanical intestinal obstruction until proved otherwise."⁹ Nevertheless, in this prospective study, bilious vomiting was not caused by intestinal obstruction in 62% of cases, and most of these infants had no significant gastrointestinal sequelae. Neonates with bilious vomiting require investigation. Intestinal malrotation must be excluded specifically. First-line investigations should include a detailed clinical examination, a plain radiograph of the abdomen and chest, routine hematology and biochemistry, and blood and urine cultures (or a more extensive septic screen if there are specific concerns about sepsis). Depending on suspected pathology, abdominal sonography and gastrointestinal contrast studies

frequently are warranted. In selected cases, a rectal biopsy or other investigations (eg, to exclude cystic fibrosis) may be necessary.

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