

Evaluation of vomiting in children

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Abstract

Vomiting is a frequently reported symptom in children and can be a presenting feature in both gastro-intestinal and non gastro-intestinal disease. Careful evaluation of all children with vomiting is essential in order to identify causes which require urgent management. Important aspects of the history include onset, frequency, duration and colour of the vomitus as well as associated gastro-intestinal, respiratory and neurological symptoms. Bilious vomiting at any age should always be taken seriously and any history of recurrent bouts of vomiting is important. A thorough examination is necessary to assess hydration status of the child and elicit other associated features such as congenital abnormalities, failure to thrive or neurological deficit. Definitive management will depend on the underlying cause and may include medical and surgical therapies. In all cases good supportive care is vital with adequate fluid and electrolyte replacement being paramount. 'Red flag' symptoms including early morning headache, signs of peritonism, lethargy, bulging fontanelle in infants, and persistent vomiting with poor growth or abnormal development, should point the clinician to the possibility of more sinister causes of vomiting.

Keywords bilious; children; gastro-oesophageal reflux; infancy; intestinal obstruction; vomiting

Introduction

Vomiting is a commonly reported symptom in children caused by both gastro-intestinal and non gastro-intestinal processes. Children presenting with vomiting require thorough evaluation to assess hydration status and establish the underlying cause. It must be remembered that vomiting can be a symptom of many varied conditions in some of which delay in diagnosis may have serious consequences.

Definitions

Vomiting – an organised, autonomic response resulting in the forceful expulsion of gastric contents through the mouth.

Nausea – the unpleasant sensation of being about to vomit which can be accompanied by autonomic changes. Nausea does

not always precede vomiting and younger children may not be able to describe it.

Regurgitation – the non-forceful return of digested or partially digested food from the stomach to the mouth.

Rumination – a clinical syndrome with effortless regurgitation of partially digested food into the mouth which is then re-chewed and re-swallowed or spat out. Rumination is more common in those with learning difficulties.

Physiology of vomiting

Vomiting is a process intended to rid the body of toxins. The vomiting centre in the medulla of the brain co-ordinates vomiting and can be activated by four major pathways: vagal afferent pathways (triggered by mechanical and chemical stimuli), chemoreceptor trigger zone (detects toxins in blood and CSF), vestibular system and the amygdala (involved in response to stress and emotion). In some conditions these pathways are inappropriately activated.

Vomiting is the end point of a co-ordinated sequence of events with contraction of the intercostal and abdominal muscles, and elevation of the diaphragm against a closed glottis, resulting in increased intra-abdominal pressure, forcing the stomach contents upwards.

History

A thorough history will help to establish diagnosis and elicit any worrying features ("red flags").

- When: vomiting onset, particular time of day? Related to eating? Recurrence?
- Timing: frequency, duration
- What: ingested food (digested/undigested), blood, bile
- Colour: clarify meaning of 'bilious' vomiting i.e. green not yellow
- Amount
- Acute or chronic symptoms

Associated symptoms:

- abdominal pain/irritability in infants
- nausea
- headache
- bowel disturbance
- pyrexia
- respiratory symptoms
- neurological symptoms
- anorexia, weight loss

Examination

- General: hydration, temperature, observations, weight loss, jaundice/pallor
- Abdomen: distension, scars, tenderness, rigidity, bowel sounds
- Neurological: Glasgow Coma Scale, meningism, neurological deficit
- Plot growth

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Causes

The most important causes of vomiting, their likely presentation and management have been divided into age groups: neonates (Table 1), infants (Table 2) and older children (Table 3). Clearly there will be some overlap.

Some of the more important causes will be discussed in further detail.

Neonates

Congenital atresias or stenosis

Intestinal atresias occur as a result of interruption of the normal development of the gastro-intestinal tract and most commonly affect the jejunum or ileum. Duodenal atresias are more likely to be associated with other congenital abnormalities and conditions such as Down syndrome (in 30%) and cardiac abnormalities (in 23–34%).

Presentation: diagnosis can be made prenatally on ultrasound by the presence of polyhydramnios, a dilated loop of bowel, or hyperechoic bowel. Bilious vomiting and abdominal distension in the first 24–48 h of life is a common presentation.

Investigations: abdominal X-ray may show signs of intestinal obstruction with dilated loops of proximal bowel, air–fluid levels and absence of gas in the lower abdomen. The classical picture in duodenal atresia is the ‘double bubble’ with dilatation of the stomach and proximal duodenum and absence of distal gas. Contrast studies confirm the diagnosis and demonstrate the level of the atresia.

Management: initial management involves appropriate fluid resuscitation and close observation of fluid and electrolyte balance, with the patient kept nil by mouth and on naso-gastric drainage. Surgery is performed once child is stable and depends on the site of the atresia. Multiple atresias should always be excluded. A period of parenteral nutrition may be required until oral or enteral feeding is established. Most patients do well post-operatively.

Malrotation and volvulus

Malrotation occurs due to a failure of normal intestinal rotation during the third month of gestation. Most commonly there is

incomplete rotation around the axis of the superior mesenteric artery, resulting in the caecum lying in the mid upper abdomen. Malrotation is often associated with bands of peritoneum known as Ladd bands which can cause extrinsic compression and obstruction of the duodenum. The mesentery is narrower than usual so there is a predisposition to midgut volvulus where the gut twists around the superior mesenteric vessels causing intestinal obstruction and ischaemia. Estimated incidence is one in 500 live births.

Associations: diaphragmatic hernia, gastroschisis and exomphalos.

Presentation: 50–75% present in the neonatal period with bilious vomiting, with or without abdominal distension due to a midgut volvulus. Later presentation is with episodes of intestinal obstruction with distension, bilious vomiting and bloody stools. Diagnosis is made within the first year in 90% but a small percentage remains asymptomatic until adulthood. Bilious vomiting at any age, but particularly in the newborn, needs to be treated as an emergency with exclusion of malrotation a priority, because volvulus can cause extensive bowel ischaemia very rapidly.

Investigations: abdominal X-ray may show signs of intestinal obstruction and an abnormal gas pattern, but a normal AXR does not exclude malrotation. Upper GI contrast study is diagnostic, confirming an abnormal position of the duodenal-jejunal flexure, and a corkscrew appearance of the duodenum if volvulus present.

Management: appropriate fluid management and nasogastric drainage should be instituted. Definitive management is urgent, most commonly a Ladd’s procedure, described as reduction of volvulus, division of mesenteric bands, placement of small bowel on right, large bowel on left and appendectomy.

In more distal intestinal obstruction such as Hirschsprung disease, rectal stenosis and meconium ileus, vomiting tends to be a later feature following delay in passage of meconium and abdominal distension. Vomiting in these conditions will be bilious.

Necrotising enterocolitis (NEC)

Necrotising enterocolitis is the commonest serious intestinal condition seen in neonates. It is an acute inflammatory condition

Common or important causes of vomiting — Neonates

| Cause | Presentation | Management |
|---|--|--|
| Malrotation/volvulus | Bilious vomiting, abdominal distension | Contrast study essential for diagnosis Urgent surgical referral |
| Hirschsprung disease/meconium ileus/ intestinal atresias | Delayed passage of meconium, abdominal distension, bilious vomiting | Surgical referral |
| NEC | Usually pre-term infant, abdominal distension, bilious vomiting | Antibiotics, enteral rest, surgical referral if severe |
| Infection | May be non-specific or point to source of infection | Investigations to establish cause May require fluid resuscitation and empirical antibiotic treatment |

Table 1

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