Investigation of infants and children with vomiting

Each month we present authoritative advice on the investigation of a common clinical problem, specially written for family doctors by the Board of Continuing Medical Education of the Royal Australasian College of Physicians.

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Vomiting and regurgitation are very common presenting symptoms to the doctor and can cause great concern to both parents and doctors.

Vomiting has been defined as the forceful expulsion of gastrointestinal contents through the mouth. Regurgitation is nonforceful. Clinically, it is often very difficult to define the boundary between acceptable regurgitation and pathological vomiting.

Regurgitation is nonspecific, physiological in most babies, and may be associated with faulty feeding techniques. It is a frequent symptom of, but not synonymous with, gastro-oesophageal reflux. Vomiting is potentially more worrisome, particularly if it is persistent, and it may be the manifestation of a wide range of significant disease states.

The doctor is thus faced with the difficulty of deciding whether investigation for disease is necessary and which investigation is appropriate. As always, a good history and physical examination, and an awareness of the possible diagnoses causing vomiting in infants and children are useful guides to appropriate investigation. It is worth noting that although some 50% of infants have regurgitation or vomiting as an isolated complaint, less than 5% have significant underlying disease.

Important causes of vomiting

In infants

Vomiting is common in infancy. Mild degrees of gastro-oesophageal reflux and associated regurgitation are sufficiently common in the first few months of life to be considered 'physiological'. However, vomiting may be the presenting symptom of many significant disorders in the infant.

In the first week of life, obstructive lesions of the gut must be considered in the vomiting baby, particularly if the vomitus is bile-stained.

During the first few days of life, newborns often vomit 'mucus' associated with acute gastritis from the high acid secretion at this time – this is rarely severe enough to require investigation.

A newborn baby with mucousy clear froth at birth (and often a history of maternal hydramnios) is suggestive of oesophageal atresia. An abdominal

IN SUMMARY

- **Although some 50% of infants have regurgitation or vomiting as an isolated complaint, less than 5% have significant underlying disease.**
- **Investigations should be tailored to confirm the suspected diagnosis, exclude complications of vomiting and make an assessment to assist management.**
- **Healthy thriving infants with regurgitation or mild uncomplicated gastro-oesophageal reflux do not require any investigation.**
- **Warning signs requiring investigation or referral include: bilious vomiting; persistent, severe or recurrent vomiting; and vomiting associated with abdominal pain, lethargy, failure to thrive or neurological signs.**

Table 1. Causes of vomiting

Common

Gastro-oesophageal reflux
Feeding problem
Infection
Gastroenteritis
Urinary tract infection
Sepsis (otitis media, meningitis, septicaemia)
Obstruction
Pyloric stenosis
Intussusception

Rare

Malrotation
Congenital adrenal hyperplasia
Inborn errors of metabolism
Raised intracranial pressure and cerebral abnormality
Meningitis, tumour, hydrocephalus, subdural haemorrhage
Munchausen by proxy
Renal tubular acidosis
Psychogenic vomiting
Cyclic vomiting
Chronic idiopathic pseudo-obstruction syndrome
Juvenile migraine

Table 2. Complications of vomiting

Dehydration and electrolyte imbalance
Failure to thrive
Aspiration of vomitus
Mallory–Weiss syndrome

x-ray will show a gasless abdomen if no fistula is present.

From birth to about 48 hours of age, bilious vomiting will require consideration of intestinal atresia or Hirschsprung's disease. Sepsis may present similarly.

After the first week, gastro-oesophageal reflux, feeding problems (especially overfeeding) and hypertrophic pyloric stenosis need to be considered as possible causes of milk vomiting.

Infants with bilious vomiting, particularly in the first four weeks of life, require exclusion or consideration of malrotation and potential volvulus as a diagnosis. However, malrotation can present at any age.

Vomiting with abdominal pain in an infant requires consideration of an obstructed inguinal hernia, urine infection, and intussusception.

In children

Common causes

In older children, nonbilious vomiting often precedes diarrhoea in infective gastroenteritis. Bilious vomiting requires exclusion of intestinal obstruction from different causes, including malrotation, volvulus or adhesions from previous surgery. An important cause of acute vomiting following abdominal pain is appendicitis.

Rarer causes

Rarer causes with nonbilious vomiting include diabetic ketoacidosis and pneumonia. Nonspecific infections, including viral illness and urine infections, can also cause vomiting in the older child. Food intolerances, anorexia or bulimia nervosa, and poisoning by self or others are less common causes of vomiting in childhood, but they still need to be considered if the common causes are not obvious. Other rare causes are listed in Table 1.

Persistent and recurrent vomiting occurs with raised intracranial pressure, migraine and peptic ulcer. Often, there are other associated symptoms or signs that may indicate the diagnosis.

History

Acute vomiting may be the first manifestation of acute gastroenteritis or acute appendicitis. However, parenteral infections, especially of the urinary tract and central nervous system (meningitis), and rarely the salt-losing form of adrenogenital syndrome and inborn errors of metabolism, may need to be ruled out. Consider inborn errors of metabolism particularly if the vomiting is associated with lethargy, reluctance to feed, failure to thrive, developmental delay, hypo- or hypertonia, drowsiness or seizures. Priority in evaluation and management needs to be given to those conditions that are potentially life-threatening, especially in an unwell child.

First, note the age and sex of the child, and ascertain whether the child is regurgitating or truly vomiting. Then, consider the following questions.

- Is the vomiting persistent or occasional, projectile, increasing in frequency and severity?
- What is the nature of the vomitus? Does it contain bile or blood?
- How soon after a feed or meal does the vomiting occur? This is sometimes helpful in the diagnosis of pyloric stenosis.
- Is the vomiting related to any particular food item ingested?
- What is the general health and nutritional state of the child?
- Is the child failing to gain weight or losing weight? Weight loss may be due to dehydration, poor intake, or malabsorption.
- What is the quantity, quality and frequency of the feeding and diet? It may be necessary to enquire about how the child is fed.
- Is the child on any medication that may cause vomiting?
- Are there any associated symptoms that may suggest intercurrent illness such as fever, choking, coughing, dysphagia, pain, drowsiness, developmental delay, poor feeding, constipation, appetite, bloody 'redcurrant jelly' stool, headaches? Regurgitation with choking and recurrent chest infections may reflect achalasia, structural disorders of the oesophagus (such as the H-type

tracheo-oesophageal fistula), oesophageal strictures, or a vascular ring compressing on the oesophagus.

In the older child, note any features that may suggest anorexia and/or bulimia nervosa. Anorexia nervosa may be associated with vomiting. Poor feeding, neurological symptoms, developmental delay and episodic vomiting may be indicative of a metabolic disorder.

Last but not least, the family history (e.g. migraine, peptic ulcer) and psychosocial dynamic factors need to be noted.

Physical examination

The clinical examination should be directed at establishing the diagnosis suggested by the history, to exclude any complications arising from the illness and other possible diagnoses.

Quickly ascertain the general state of the child, with particular attention to how unwell the child is, his or her weight, and any signs of dehydration.

Jaundice in a vomiting infant requires a consideration of hepatitis, urinary tract infection, a biliary tract abnormality and, occasionally, pyloric stenosis.

An elevated blood pressure may be associated with renal or adrenal disorders that may present with vomiting.

A tense fontanelle suggests raised intracranial pressure from causes including meningitis, intracranial tumour, hydrocephalus, subdural haematoma and vitamin A intoxication.

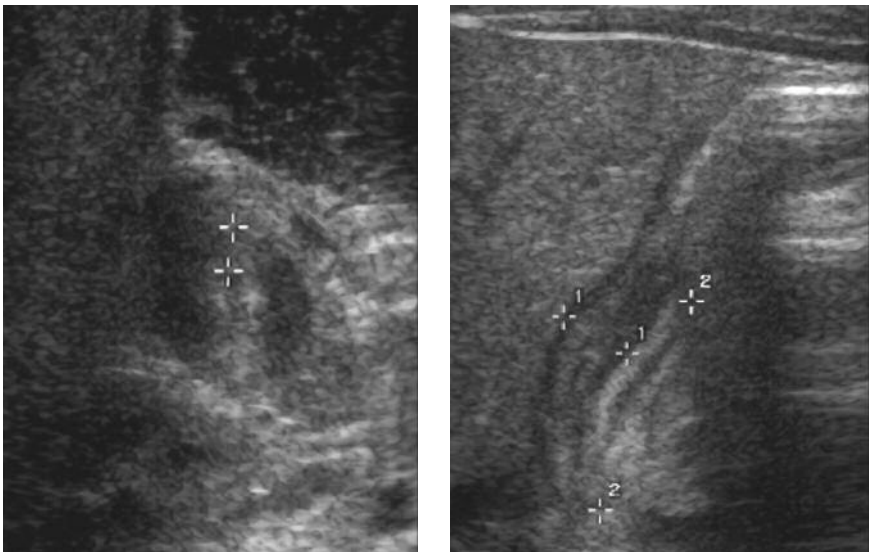
In the abdomen, the presence of any distension, visible peristalsis, alteration in bowel sounds, palpable organs and masses, tenderness and guarding should be noted and evaluated.

A review of the systems should include attention to the presence of any dysmorphic features, neurological signs and development delay.

Investigations

Investigations should be tailored to confirm the suspected diagnosis, exclude complications of vomiting (Table 2) and make an assessment to assist management. Healthy thriving infants with regurgitation or mild uncomplicated gastro-oesophageal reflux do not require any investigation.

In other children, depending on the clinical situation, the following would be appropriate and helpful.



Figures 1a and b. Ultrasound showing hypertrophic pyloric stenosis. a (left). The transverse scan shows hypoechoic (black) thickened muscle and a central echogenic (white) mucosa. b (right). The longitudinal scan shows markedly thickened pyloric muscle, indicated by the crosses marked '1'. The other crosses indicate the pyloric canal.

Urine analysis, microscopy and culture

Urine analysis for protein, blood, sugar and ketones, and microscopy for red and pus cells, should be performed, and the urine cultured for bacterial organisms that cause urinary tract infection. Analysis for amino acids may be indicated if a metabolic cause is suspected.

Abdominal ultrasound

An ultrasound can be helpful for the diagnosis of pyloric stenosis (Figure 1) when a pyloric mass is not palpable.

Upper gastrointestinal endoscopy

Upper gastrointestinal endoscopy with biopsy is helpful to exclude or grade oesophagitis (Figures 2 and 3). It may confirm or rule out peptic ulcer, duodenitis and gastritis, and hiatal hernia.

Serum electrolytes and urea

A blood sample for urea, electrolytes and acid–base status is useful to detect electrolyte imbalance associated with vomiting. A large anion gap or metabolic acidosis could point to a metabolic disorder.

Abdominal x-ray

A plain abdominal x-ray – supine and erect (or lateral decubitus in an infant) – is necessary if obstruction is considered.

Barium meal

A barium meal may identify significant gastro-oesophageal reflux, and/or hiatal hernia, oesophageal stricture, stenosis or achalasia.

Nuclear milk scan or salivagram

A nuclear milk scan or salivagram (Figure 4) is useful to demonstrate aspiration when aspiration of refluxed material is

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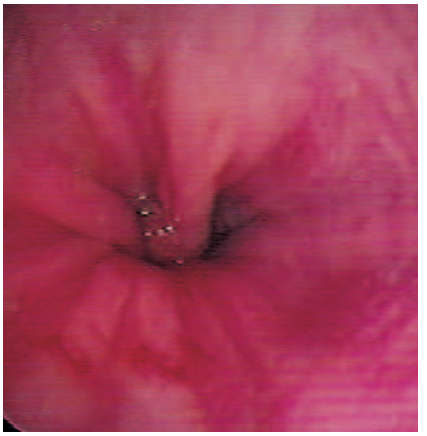

Figure 2. Oesophagitis at endoscopy.

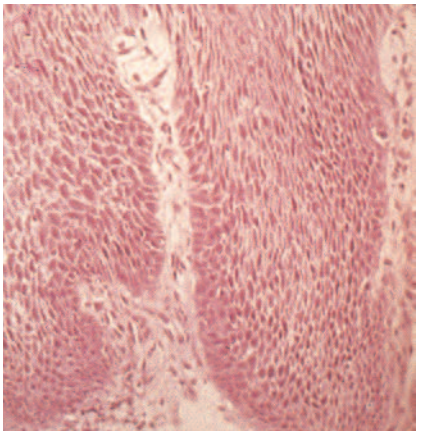

Figure 3. Mild oesophagitis at biopsy.

suspected as the cause of unexplained lower respiratory infections.

A pH study

A 24-hour pH study could document frequency and duration of reflux, and correlate symptoms with reflux. However, the test is time consuming, relatively invasive and uncomfortable for patients, and it does not confirm oesophagitis.

When to refer

Special challenges that may require referral to a specialist include:

- a neonate or young infant
- an unwell child
- significant associated symptoms, including bilious vomiting, haematemesis, failure to thrive, neurological symptoms, drowsiness
- suspected bowel obstruction
- metabolic disorders
- psychological problems and complex psychosocial factors.

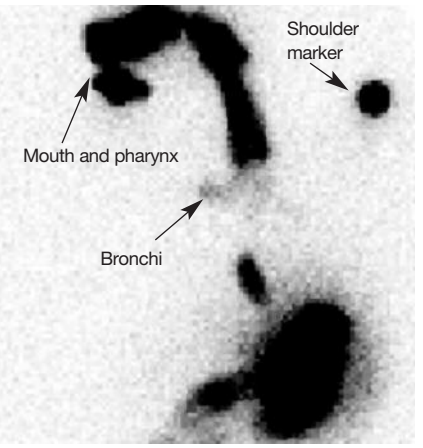

Figure 4. Salivagram showing inco-ordinate swallowing with bronchial aspiration in a 12-year-old boy with cerebral palsy.

Conclusion

Vomiting is an extremely common symptom in infancy and childhood. Often, when it is an isolated complaint, no significant cause can be found. However, vomiting could be the first manifestation of severe illness that requires a sound history, physical examination and appropriate investigation to arrive at the correct diagnosis and to institute proper management. Expensive, invasive and costly investigations are often not required. MT

Further reading

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3. Kilham H, Isaacs D. The New Children's Hospital handbook. Sydney: New Children's Hospital, 1999.