

## Paediatric Gastro-Oesophageal Reflux Disease

Harween Dogra , Bhavini Lad and Dinesh Sirisena

### Definition

Gastro-oesophageal reflux (GOR) is the passage of gastric contents into the oesophagus. In most infants with GOR the outcome is benign & self-limiting. <sup>(1)</sup>

### Incidence/Prevalence

Peak incidence of GOR is around 4 months of age, and it resolves spontaneously by 1-2 years of age in most patients. <sup>(2)</sup>

Regurgitation (possetting or spitting up) is the most common presentation in infants with GOR. Regurgitation of at least one episode a day is seen in:

- 50% of infants 0-3 months
- 67% of infants at 4 months
- 5% at 10 to 12 months of age <sup>(3)</sup>

It is important to note that in infants (younger than 1 year of age) who are otherwise well and symptomatic, regurgitation may be considered entirely normal. <sup>(4)</sup>

### Causes/Risks

GOR occurs due to the transient, inappropriate relaxation of the lower oesophageal sphincter, which allows the stomach contents to pass into the oesophagus.

GOR can be physiological or pathological:

- Physiological GOR – when the infant has normal weight gain and experiences no complications and is generally well.
- Pathological GOR – also known as gastro-oesophageal reflux disease (GORD) is when reflux is associated with other symptoms like failure to thrive or weight loss, feeding or sleeping problems, chronic respiratory disorders, oesophagitis, haematemesis etc <sup>(3)</sup>

Several anatomical and physiological conditions make infants (younger than 1 year of age) more prone to GORD than older children and adults:

- Short, narrow oesophagus
- Delayed gastric emptying
- Shorter, lower oesophageal sphincter that is slightly above, rather than below, the diaphragm
- Liquid diet and high calorie requirements, putting a strain on gastric capacity

- Larger ratio of gastric volume to oesophageal volume<sup>(4)</sup>

Most children have no specific risk factors for GORD. Children with the following conditions are at increased risk for developing GORD and for progressing to severe GORD:

- Severe neurological impairment
- Prematurity
- Cystic fibrosis
- Gastro-oesophageal abnormalities (even after surgical repair), e.g. Oesophageal atresia, diaphragmatic hernia, pyloric stenosis
- Bronchopulmonary dysplasia (preterm infants with lung disease)
- Hiatus hernia
- Oesophageal sphincter disorders
- Raised intra-abdominal pressure<sup>(5)</sup>

### Symptoms

GORD in infants and children can present with a variety of symptoms many of which can be relatively non-specific. Equally, other pathologies may lead to the development of reflux. Those in the early years tend to be based on observations by parents, while older, more vocal children express symptoms more akin to adult presentations.

As such, the history/symptoms will be broadly divided into those expected for infants (<1yr), young children (1-5yrs) and older children (>5yrs).

### Infants <sup>(6-10)</sup>

- 1) Excessive possetting/regurgitation
  - a) Possetting is a normal phenomenon in infants
  - b) Frequent episodes, together with vomiting may indicate underlying GORD
  - c) Projectile vomiting may indicate an obstructive pathology
- 2) Difficult/rapid cessation of feeds
  - a) There may be difficulty initiating feeds and latching
  - b) Early cessation may be precipitated with the onset of reflux
- 3) Failure to thrive
  - a) No weight loss can be expected
  - b) Weight loss crossing centiles on the growth chart must be addressed urgently
- 4) Sleep disturbance
  - a) Particularly after an evening feed

- b) This is often associated with irritability and inconsolable crying
- 5) Irritability and inconsolable crying
  - a) One of the commonest presentations to the GP
  - b) This may occur during feeds or shortly afterwards
- 6) Apnoeic episodes
  - a) A witnessed pausing in respiratory effort
  - b) Occurring at night, it can mimic obstructive sleep apnoea
  - c) This may indicate a more serious underlying pathology and requires urgent assessment
  - d) It is likely to be more prevalent in this age group

#### Young Children<sup>(6-10)</sup>

- 1) Regurgitation/vomiting
  - a) Beating/rubbing the chest may be an early sign of this pathology
  - b) Reflux symptoms can be typical of those in adults
- 2) Failure to thrive
- 3) Refusing food
  - a) Similar to the infant, however, the younger child can be more vocal in their refusal
- 4) Abdominal/chest pain
  - a) With increasing age, children may demonstrate gastric irritation with abdominal pain
  - b) Acid reflux producing oesophagitis may present as chest discomfort
  - c) Both are similar to symptoms adults experience
- 5) Irritability
- 6) Persistent/nocturnal cough/wheezing
  - a) There may be a dry, non productive cough
  - b) Secondary to pharyngeal irritation
  - c) There may be no co-morbidities or underlying pathologies
  - d) Symptoms can be mistaken for asthma by parents

#### Older Children<sup>(9)</sup>

- 1) Dyspepsia/vomiting
  - a) These symptoms in older children are thought to have a similar reliability in diagnosis as in adults
- 2) Dysphagia/odynophagia
  - a) As children become more articulate they may be able to describe these symptoms in relation to meals
  - b) Particularly with chronic GORD and the development of a Barrett's Oesophagus
- 3) Abdominal/chest pains
- 4) Persistent/nocturnal coughing/wheezing

#### Other Symptoms

Symptoms which can be identified but which may be considered less life-threatening include:

- 1) Dental erosions
- 2) Hiccups
- 3) Halitosis

Those deserving urgent investigation and intervention include:

- 1) Forceful/Bilious vomiting

- 2) Suggesting a possible obstructive pathology
- 3) This requires urgent surgical referral
- 4) Force of vomiting may not always indicate the severity of the problem
- 5) Upper gastrointestinal bleeding/hematemesis
- 6) This may be a consequence of increased pressure from vomiting
- 7) Similar to a Mallory-Weiss pathology
- 8) An urgent review by local Paediatric Gastroenterologists is warranted
- 9) Profuse diarrhoea or constipation
- 10) Failure to thrive/weight loss
- 11) Lethargy
- 12) Apnoeic episodes

#### **Physical Signs**

As with the previous section, physical signs will be considered for each age range as above: infants (<1yr), young children (1-5yrs) and older children (>5yrs).

#### Infants<sup>(9)</sup>

- 1) Irritability when lying flat
  - a) Particularly following feeds
  - b) Especially when supine
- 2) Weight loss
  - a) Regular monitoring with repeat measurements
  - b) A single weight cannot imply loss
  - c) This is usually a late sign
- 3) Arching of the back
  - a) Secondary to oesophageal irritation
  - b) Can be associated with increased tone and crying
- 4) Dehydration
  - a) Loss of fluid through vomiting
  - b) Look for
- 5) Dry mouth
- 6) Sunken fontanelle
- 7) Prolonged capillary refill time
- 8) Reduced skin turgor
- 9) Reduced urine output
- 10) Crying without tears
- 11) Apnoeas
  - a) Periods of reduced respiratory effort
  - b) Noted by parents as pauses in breathing

#### Young Children<sup>(9)</sup>

- 1) Weight loss
- 2) Dehydration
- 3) Anaemia
  - a) Associated with chronic symptoms and gradual loss of iron
  - b) Look for Pallor/pale conjunctivae, Glossitis, Angular stomatitis, Pica
- 4) Dysphagia/choking with food
  - a) Particularly with prolonged GOR and development of stricturing
- 5) Difficulty in breathing/wheezing/lower respiratory tract infection (LRTI)

- a) Similar to asthma on examination
- b) Signs of LRTI on auscultation
- c) Possibly stridor

**Older Children** <sup>(9)</sup>

- 1) Weight loss
- 2) Dehydration
- 3) Anaemia
- 4) Dysphagia/Choking with food
- 5) Difficulty in breathing/Wheezing/LRTI
- 6) Persistent sinusitis

Signs requiring urgent intervention include <sup>(9)</sup>:

- 1) Hematochezia
  - a) Unaltered blood in stool
  - b) Stools take on a red appearance
- 2) Onset of vomiting after 6 months of life
- 3) Fever
  - a) Uncommon with GOR
  - b) Indicating an infective pathology
- 4) Hepatosplenomegaly
  - a) An underlying condition other than GOR is likely
  - b) Important pathologies must not be missed
- 5) Bulging fontanelle
  - a) Indicating increased intracranial pressure and an alternative pathology underlying the reflux
- 6) Macro/microcephaly
  - a) Suggestive of hydrocephalus or a congenital malformation
- 7) Seizures
  - a) Related to a number of other problems
  - b) Metabolic pathologies should figure highly in any differential diagnosis
- 8) Abdominal distension with reduced bowel sounds
  - a) Tinkling bowel sounds and an pain may suggest bowel obstruction

**Differential diagnoses**

Common differential diagnoses have been noted in Table 1, however, this is by no means a definitive list of conditions or presentations. It should be taken as an indication to the diverse presentations that can mimic or precipitate GOR (adapted from <sup>(9)</sup> and <sup>(10)</sup>).

Condition	History/Symptoms	Signs
Pyloric Stenosis	Sudden onset vomiting Constantly hungry baby Usually males First 4-6 weeks of life	Non-bilious projectile vomiting Visible peristalsis Positive test feed
Malrotation	Sudden onset pain in volvulus Reduced bowel movement Vomiting	Bilious vomiting Abdominal distension Pulling up legs with pain onset
Cow's Milk Allergy	Vomiting and Diarrhoea Eczema Relationship to feeds Failure to thrive	Urticaria Watery stool Weight loss crossing centiles

Constipation	Infrequent stools Straining Blood in nappy	Palpable stool on examination Irritable baby
Urinary Tract Infections	Vomiting Fever (can be without focus) Poor feeding	Lethargy Reduced urinary output Abdominal pain
Viral Gastroenteritis	Vomiting Diarrhoea Fever Lethargy	Dehydration Viral Rash
Hypocalcemia	Poor feeding Lethargy Tetany Seizures	Seizures Apnoeas Tremor Abdominal distension
Hydrocephalus	Vomiting Lethargy Confusion Visual changes	Increased head size Gait change Altered consciousness
Meningitis	Fever Lethargy Vomiting Confusion	Neck stiffness Photophobia Rash (late onset)
Drugs/Toxins	Vomiting Lethargy Ingestion history	Dependant upon drug ingested

Table 1

**Investigations and management of infants (<1 yr old)**

Complicated cases of GORD (not gaining weight/faltering growth or non-GI symptoms e.g. cough), should be referred to a Paediatrician while investigating for causes and instituting simple management.

Simple investigations to do in primary care:

- 1) Abdominal examination for hernias/pyloric stenosis (test feed)
- 2) Urine dip to rule out UTI
- 3) Blood tests for electrolyte abnormalities, coeliac screen (if weaned)

Referral to a Paediatrician will result in imaging investigations such as Abdominal x-ray and upper GI contrast study to rule out malrotation/hiatus hernia/achalasia in older children, sometimes GORD can be seen on contrast studies. The Paediatrician may go on to arrange a pH/impedance study, upper GI endoscopy or allergy testing.

Management

- 1) Calculate feed requirements, parents may be over feeding, e.g. approximate fluid requirement 100-120ml/kg/day every 3-6hrs (depending on age and whether weaned on to solids)
- 2) In thriving infants there is no evidence that pharmacological therapy will make a significant difference to symptoms.
- 3) Therefore the mainstay of management is reassurance. Simple pharmacological intervention can be tried with feed thickener (in formula fed babies) or Alginates e.g. Gaviscon (can be mixed with water for breast fed babies)

- 4) If there are continued concerns refer to Paediatrician for on going investigations and management.
- 5) Recent evidence shows that some infants may have cow's milk protein intolerance<sup>(9)</sup>. Therefore for breast fed babies the mother could try cutting out dairy from her diet (important to have supervision from dietician re: nutritional requirements while breast feeding). Formula fed babies can have a 2 week trial of hydrolysed/amino acid based formula e.g. Progestimil, Nutramigen, Neocate.
- 6) Reviews from ESPGHAN<sup>(9)</sup> and DTB<sup>(11)</sup> recommend H2RA (H2 receptor antagonists eg. Ranitidine) may help, though there is little evidence – these could be commenced while waiting for an appointment with the Paediatrician.
- 7) (Currently there is no role for Domperidone. The next medication a Paediatrician may try is Omeprazole ± omission of cow's milk protein)<sup>(11)</sup>

#### Investigation and management of older children (>18mths)

As before, complicated cases of GORD (not gaining weight/faltering growth or non-GI symptoms e.g. cough), should be referred to a Paediatrician while investigating for causes and instituting simple management.

#### Investigations

- 1) Urine dip, if there are symptoms of vomiting
- 2) Stool H. Pylori antigen test
- 3) Bloods tests inc. inflammatory markers, H. Pylori antigen, celiac screen

#### Management

- 1) If main symptom heartburn with no evidence of H. Pylori:
- 2) Reassurance and lifestyle changes (weight loss, dietary changes, timing of meals), up to 4 week trial of PPI (Proton pump inhibitor e.g. lansoprazole, omeprazole).
- 3) If symptoms improve then continue PPI for up to 6 months, then wean off over 4 weeks (evidence that if stopped suddenly patients may get rebound symptoms)<sup>(10)</sup>.
- 4) If PPI doesn't help or symptoms recur after stopping the PPI, then refer to a Paediatrician.
- 5) The Paediatrician may investigate with more blood tests e.g. Autoimmune screen, allergy testing, imaging, pH/impedance study, endoscopy.

#### REFERENCES

1. Pritchard DS, Baber N, Stephenson T. Should domperidone be used for the treatment of gastro-oesophageal reflux in children? Systematic review of randomized controlled trials in children aged 1 month to 11 years old. *Br J Clin Pharmacol.* 2005; 59(6): 725-9.
2. Nelson SP, Chen EH, Syniar GM, Christoffel K. Prevalence of symptoms of gastro-oesophageal reflux during infancy: a paediatric practice-based survey. *Arch Pediatr Adolesc Med.* 1997; 151: 569-72.
3. Salvatore S, Vanderplas, Y. Gastroesophageal reflux & cow milk allergy: Is there a link? *Pediatrics.* 2002; 110(5): 972-984.
4. Henry, SM. Discerning differences: gastroesophageal reflux & gastroesophageal reflux disease in infants. *Advances in Neonatal Care.* 2004; (4)4: 235-247.
5. [www.gpnotebook.co.uk](http://www.gpnotebook.co.uk). [http://www.gpnotebook.co.uk/simplepage.cfm?ID=x20100221174705261069&linked=7]. Accessed 14/1/2011.
6. Bentley D et al. *Pediatric Gastroenterology and Clinical Nutrition.* London: REMEDICA. 2002.
7. Taeusch D et al. *Pediatric Gastroenterology and Clinical Nutrition.* Philadelphia: ELSEVIER. 2005.
8. Fanaroff A and Martin R. *Neonatal-perinatal medicine: diseases of the fetus and infant, Volume 1.* 7th ed. Massachusetts: MOSBY. 2001.
9. Vandenas Y et al. (2009) *Pediatric Gastroesophageal Reflux Clinical Practice Guidelines: Joint Recommendations of the North American Society For Pediatric Gastroenterology, Hepatology, and Nutrition (NASPGHAN) and the European Society For Pediatric Gastroenterology, Hepatology, and Nutrition (ESPGHAN).* *Journal of Pediatric Gastroenterology and Nutrition.* 2009; 49: 498-547.
10. Jung A. Gastroesophageal Reflux in Infants and Children. *Am Fam Physician.* 2001; 64 1853-60.
11. Managing gastro-oesophageal reflux in infants, *Drugs and Therapeutics Bulletin, BMJ* 2010; 341:c4420

#### Competing Interests

None declared

#### Author Details

Harween Dogra MBBS BMedSci MRCPCH, ST3 Paediatrics, Royal London Hospital, Whitechapel Rd, London E1 1BB  
 Bhavini Lad BMedSci MBBS nMRCGP, General Practitioner, Newham, London  
 Dinesh Sirisena BSc DCH DRCOG DFFP MRCGP, General Practitioner Edgware, London  
 CORRESPONDENCE: Harween Dogra MBBS BMedSci MRCPCH, ST3 Paediatrics, Royal London Hospital, Whitechapel Rd, London E1 1BB  
 Email: harweenie@hotmail.com