Paediatric – Gastroenterology

**VOMITING**

**Possetting** – ‘Small amounts of milk which often accompany the return of swallowed air (wind)’ – Normal.

**Regurgitation** – ‘Larger, more frequent losses’ – Indication of GORD.

**Vomiting** – ‘Forceful ejection of gastric contents’.

### Causes of Vomiting

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<td>Intestinal obstruction:</td>
<td>○ ↑ intracranial pressure</td>
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<td>○ GORD</td>
<td>- Pyloric stenosis</td>
<td>○ Coeliac disease</td>
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<td>○ Feeding problems</td>
<td>- Duodenal stenosis/ atresia</td>
<td>○ Bulimia/ anorexia nervosa</td>
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<td>○ Infection:</td>
<td>- Intussusception</td>
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<td>- UTI</td>
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<td>○ Dietary protein intolerance</td>
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<td>○ Helicobacter pylori infection</td>
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<td>○ Migraine</td>
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### Diagnostic clues in vomiting infant

- Bile stained vomit – Exclude intestinal obstruction
- Blood in vomit – Suggests oesophagitis/ peptic ulceration/ oral or nasal bleeding
- Projectile vomiting in 2-7 weeks of life – Pyloric stenosis
- Are there UTI, CNS, GI infection symptoms?
- Is the infant dehydrated?
- Abdominal distension – Suggests intestinal obstruction
# Gastro-Oesophageal Reflux (GORD)

| S&S | - Irritability  
|     | - Vomiting  
|     | - Feeding difficulties  
|     | - Weight loss  
|     | - Heartburn (older children) |

| Risk Factors | - Cerebral palsy.  
|              | - Newborns with bronchopulmonary dysplasia (chronic lung disease of prematurity).  
|              | - Surgery for oesophageal atresia or diaphragmatic hernia. |

| Pathophysiology | o Abnormal: Acidity in oesophagus from reflux of stomach contents > 4% of a 24-h period.  
|                 | o Immaturity of lower oesophageal sphincter leading to episodes of inappropriate relaxation.  
|                 | o Short intra-abdo length of oesophagus.  
|                 | Often resolves spontaneously due to:  
|                 | - Maturation of LOS.  
|                 | - Upright position.  
|                 | - More solids in diet. |

| Diagnosis | - Mild and uncomplicated – Diagnose clinically.  
|           | - 24-h oesophageal pH monitoring.  
|           | - Contrast studies of UGIT – Exclude anatomical abnormalities.  
|           | - Endoscopy.  
|           | - Oesophageal biopsy. |

| Treatment | - SMA thick and easy  
|           | - Thickening agents e.g. Carobel  
|           | - Positioning upright post feeds  
|           | - H2-antagonist e.g. ranitidine  
|           | - PPI e.g. omeprazole  
|           | - Domperidone – Enhances gastric emptying  
|           | - Surgery – Fundoplication (fundus of stomach wrapped around intra-abdominal oesophagus) |

| Complications | - Failure to thrive  
|               | - Feeding problems  
|               | - Oesophagitis – Pain, bleeding, iron deficiency, peptic stricture  
|               | - Pulmonary aspiration leading to bronchitis/ pneumonia  
|               | - Sandifer’s syndrome – Dystonic movements of head and neck  
|               | - Apnoea (in preterms)  
|               | - Apparent life-threatening events (ALTEs) or Sudden infant death syndrome (SIDS) |
# PYLORIC STENOSIS

## S&S
- **Projectile vomiting** (not bile stained) - ↑ frequency and severity with time
- **Constant hunger**
- Hypochloraeamic alkalosis with low plasma potassium (from vomiting acid stomach contents)
- **Weight loss/ poor weight gain**

## Risk factors
- Presents age 2-7 weeks (irrespective of gestational age)
- **Boys: Girls = 4:1**
- First borns
- FH (especially maternal)

## Pathophysiology
Hypertrophy of pylorus causing gastric outlet obstruction

## Diagnosis
- **Test feed**
  - Note gastric peristalsis (wave moving from left to right across abdomen)
  - Pyloric mass or ‘olive’ palpable in RUQ
  - If stomach over-distended with air, empty with nasogatric tube before palpation
- **Ultrasound**
- If in doubt – Barium meal

## Management
- **I.V. fluids** to correct fluid and electrolytes
- CI and K deficits replaced
- **Pyloromyotomy** (muscle, but not mucosa, of pylorus is cut)
- Postoperatively – Fed next day, discharge 2-3 days
EXCESSIVE CRYING – Causes

- Inappropriate feeding, wrapping, reassurance, emotional climate
- UTI
- Meningitis
- Middle ear infection
- Unrecognised fracture
- Oesophagitis
- Torsion of testis
- Severe nappy rash
- Constipation
- Coeliac disease
- Non-accidental injury

INFANT ‘COLIC’

Describes a common symptom complex.

Occurs during first few months of life (often resolves at 4 months of age).

S&S:
- Paroxysmal, inconsolable crying/screaming.
- Drawing up of knees.
- Symptoms take place several times a day – Particularly in the evening.

Possible causes:
- Intestinal.
- Cow’s milk protein intolerance.
- GORD.

Sympathetic advice is helpful.

Complications: May precipitate non-accidental injury in infants already at risk.
**ACUTE ABDOMINAL PAIN IN CHILDREN**

**Acute Appendicitis**
- **Commonest cause of abdo pain in children.**
- **Symptoms:**
  - Anorexia
  - Vomiting
  - Abdo pain – Central and colicky, then localizing to r.i.f.
- **Signs:**
  - Flushed face with oral foector
  - Fever
  - Abdo pain aggravated by movement
  - Tenderness
- **Investigations:**
  - FBC
  - Laparoscopy
- **Treatment:**
  - Appendicectomy (if perforation give fluid resuscitation and i.v. prior to laparotomy)
- **Complications:**
  - Shock

**Meckel’s Diverticulum**
- Ileal remnant of the vitello-intestinal duct – Contains ectopic gastric mucosa or pancreatic tissue.
- **S&S:**
  - Asymptomatic
  - Rectal bleeding
- **Other presentations:**
  - Intussusception
  - Diverticulitis
  - Volvulus around a band
- **Investigations:**
  - Technetium scan
  - Surgical resection

**Malrotation**
- Causes:
  - Small bowel mesentery not fixed at duodenal flexure/ ileocaecal region – Predisposing to volvulus
  - Duodenal flexure failure to rotate adequately
  - Caeum failing to rotate and descend to the right
- **Presentations:**
  - Obstruction
  - Obstruction + compromised blood supply
- **S&S:**
  - Bilious vomiting (dark-green)
- **Investigations:**
  - UGI contrast study
- **Treatment:**
  - If signs of vascular compromise – Urgent laparotomy
  - Operation to correct (± appendicectomy to avoid diagnostic confusion in event of appendicitis)

**Intussusception**
- ‘Invagination of proximal bowel into a distal segment’
- Commonest cause of I.O. in infants after neonatal period.
- Occurs between 2/12 and 2yoa.
- **Pathophysiology:**
  - Ileum passing to caecum/colon through ileo-caecal valve.
- **S&S:**
  - Paroxysmal, severe colicky pain
  - Draws legs up
  - Pallor in episodes pain
  - Abdo distension
  - Sausage-shaped mass (often palpable)
  - Redcurrent jelly stool (blood-stained mucus)
- **Diagnosis & Treatment:**
  - AXR
  - I.V. volume expansion (often pooling of fluid in gut which may cause hypovolaemic shock)
  - Rectal air insufflation
  - Operative reduction
- **Complications:**
  - Shock

**Non-specific abdo pain (NSAP) and mesenteric adenitis**
- **NSAP:**
  - Resolves in 24-48hrs
  - Pain less severe than appendicitis
  - Tenderness in r.i.f. variable
  - With RTI with cervical lymphadenopathy
  - If abdo signs do not resolve = appendicectomy
- **Mesenteric adenitis:**
  - Large mesenteric nodes, appendix normal.

**Surgical**

**Peritonitis**

**Pancreatitis**

**Inguinal hernia**

**Gynaecological in pubertal females**

**In half children admitted to hospital pain undiagnosed**

**Sickle cell disease**

**Medical**

**Acute Enteritis**

**Gastroenteritis**

**DKA**

**Extra-abdominal:**
- Upper respiratory tract infection
- Lower lobe pneumonia – Referred pain
- Hip and spine
- Peritonitis in patients with ascites from nephritic syndrome

**Hepatitis**

**IBD**

**Constipation**

**Toxins e.g. lead**

**Henoch-Schonlein purpura**
**Notes by Harriet Wood**

**Recurrent Abdo Pain in Children**

- Sufficient to interrupt normal activities for at least 3 months – Occurs in 10% school aged children - <10% of these have a definable organic cause

**Abdominal Migraine**
- Cranial migraine often associated with abdo pain in addition to headaches
- Often FH/ PH of migraines
- Treatment: Pizotifen

**The 90%**:
- Pain central, around umbilicus
- Otherwise entirely well

Due to:
- Psychological
- Cycle: Anxiety and escalation leading to pain, create family distress, demands for investigation, more anxiety.

Some have:
- IBS, Non-ulcer dyspepsia, Abdo migraine.

**IBS**
- Altered GI motility and an abnormal sensation of intra-abdominal events – Abnormally forceful contractions occur.
- Related to psychosocial factors e.g. stress and anxiety.
- RF: +ve FH

**S&S:**
- Abdo pain – Worse before or relieved by defecation
- Mucousy stools
- Bloating
- Feeling of incomplete defecation
- Constipation – Alternating with normal/loose stools

**Non-Ulcer Dyspepsia**
- (suggesting Upper GI disorder)
  - Epigastric pain
  - Postprandial vomiting
  - Belching
  - Bloating
  - Early satiety
  - Heartburn

**Investigations:**
- Endoscopy (gastric motility abnormal – fails to reveal ulcer/ mucosal disease)

**Management**
- Full history and examination
  - Establish child is growing normally and no abnormalities
  - Must be seen to be doing something!
- Urine microscopy and culture for possible UTI

**Prognosis**
- ½ rapidly become free of symptoms.
- ¼ symptoms take some months to resolve.
- ¼ symptoms continue to return in adulthood as IBS, non-ulcer dyspepsia or cranial migraine.
GASTROENTERITIS

‘Infective diarrhoea and vomiting’

Causes:
- Viral: Rotavirus (commonest), adenovirus, calicivirus, corona, astroviruses.

Dehydration
- Cause of death in gastroenteritis and its correction is fundamental to treatment.
- Total body deficit of NA and water.

Types of Dehydration

Isotraemic:
- Loss of NA and water are proportional.
- Plasma NA remains within normal range.

Hyponatraemic dehydration:
- Na losses exceed those of water.
- Plasma NA falls.
- Shift in water from extra- to intra-cellular compartments = ↑ brain volume = sometimes convulsions.
- Common in poorly nourished in developing countries.

Hypernatraemic dehydration:
- Water loss exceeds sodium loss and plasma sodium concentration ↑ (rare).
- Results from high insensible water loss e.g. high fever/ hot, dry environment/ low-sodium diarrhoea.
- Shift in water from intra- to extra-cellular compartments.
- Harder to recognise as less evidence of signs.
- Treatment: ↓ plasma sodium slowly to avoid convulsions.

Other causes of diarrhoea:
- Food intolerance
- Antibiotics

Causes of bloody diarrhoea:
- Bacterial (less common): Campylobacter jejuni, shigella, salmonellae, enterotoxigenic E.coli, cholera
- NEC
- Intussusception
- IBD
Clinical Features and Treatment Dehydration

<table>
<thead>
<tr>
<th>Type</th>
<th>Clinical Features</th>
<th>Treatment</th>
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<tbody>
<tr>
<td>Mild</td>
<td>- Dry mucous membranes</td>
<td>Short-term substitution of normal feeds with glucose-electrolyte solution.</td>
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<td></td>
<td>- &lt;5% body weight loss</td>
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<tr>
<td>Moderate</td>
<td>- 5-10% body weight loss</td>
<td>- Oral rehydration, give 100ml/kg over 6hrs</td>
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<td>- Thirst, restless, lethargic</td>
<td>- If no improvement give i.v. rehydration</td>
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<tr>
<td></td>
<td>- ↓ tears</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- ↓ tissue elasticity</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Dry mucous membranes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- CRT: normal/ prolonged</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- BP: normal/ low</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Urine output: ↓</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Pulse: Rapid</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Eyes: sunken</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Anterior fontanelle: sunken</td>
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Severe

- >10% body weight loss
- Drowsy, cold, sweating
- Tears: absent
- Tissue elasticity: absent
- V.dry mucous membranes
- CRT: prolonged (>2s)
- BP: low/ unrecognizable
- Urine output: oliguria
- Pulse: rapid, weak, possibly impalpable
- Eyes: v.sunken
- Anterior fontanelle: v.sunken

- I.V. rehydration
- Add plasma chloride to i.v. infusion once urinating
- Shocked then resuscitate with plasma volume expansion
- Monitor: fluid balance, weight, plasma electrolytes
- Complications: acute renal failure, pulmonary oedema.

There is no place for anti-diarrhoea drugs e.g. loperamide and anti-emetics as:
a) they are ineffective,  b) prolong excretion of bacteria in stools,  c) side-effects,  d) cost,
e) focus attention from oral rehydration.

Post-Gastroenteritis Syndrome

- Return of watery diarrhoea – Temporary lactulose intolerance may have developed.
- Treatment: Oral rehydration solution for 24h, then, introduction of a normal diet.
- Rarely need to exclude cow’s milk, disaccharides and gluten.

Toddler Diarrhoea

‘Pea and carrots syndrome’ - Presence of undigested vegetables.
- Results from underlying maturation delay in intestinal motility
- Most grow out of it by 5yoa.
MALABSORPTION

Presentation:
- Failure to thrive ± anaemia
- Abnormal stools – Difficult to flush down toilet, odour pervades whole house
- ± Diarrhoea
- ± Abdominal protrusion

Coeliac Disease

Pathophysiology:
- Gliadin part of gluten causes immunological response in small intestine mucosa →
  Villus atrophy → Flat mucosa.
- Gluten is found in: wheat, barley, rye, oats.

Children often present in first two years of life.

S&S:
- Irritability
- Abnormal stools
- Abdominal distension
- Buttock wasting

Diagnosis:
- Jejunal biopsy (confirm villus atrophy).
- Screen with IgA gliadin, anti-reticulin, anti-endomysium antibodies.
- Resolution of symptoms and catch-up growth upon gluten withdrawal.

Management:
- Gluten free diet for life.
  - After 5 years: Cautious reintroduction may be tried.

Transient Dietary Protein Intolerances

S&S:
- Diarrhoea and/or vomiting
- Failure to thrive
- Eczema
- Acute colitis
- Migraine

Types:
- Cow’s milk protein, soya, wheat, fish, chicken, eggs, rice
**Risk Factors:**
- IgA deficiency
- FH of atopy

**Diagnosis:**
- Jejunal biopsy (cow’s milk protein = patchy enteropathy in jejunal mucosa).

**Affected children have:**
- Eosinophilia in peripheral blood
- +ve antibody test to specific food proteins (RAST tests)
- High IgE conc in plasma

**Other causes of malabsorption**
- Cystic fibrosis
- Post-enteritis enteropathy
- Short bowel syndrome

**INFLAMMATORY BOWEL DISEASE**

**Crohn’s Disease**

**Pathophysiology:**
- Affects any part of GI tract from mouth to anus.
  - Commonly distal ileum and proximal colon.
- Intestinal thickening.
- Adhesions between affected loops.
- Histologically: Presence of non-caseating epitheloid cell granulomata.

**S&S:**
- Abdo pain
- Diarrhoea
- Growth failure with pubertal delay
- Oral and perianal ulcers
- Arthritis
- Uveitis
- Erythema nodosum

**Diagnosis:**
- Barium follow-through (narrowing, fissuring, mucosal irregularities, mural thickening).
- Colonoscopy take biopsy for histology.
- ↑ C-reactive protein and ESR.
Notes by Harriet Wood

Treatment:
- Steroids
- Elemental diet for 6 weeks.
- Overnight enteral feeding (correct growth failure).
- Surgery

Prognosis:
- Most patients lead normal lives with occasional recurrent disease.

**Ulcerative Colitis**

‘Recurrent, inflammatory, ulcerative disease involving the mucous membrane of the colon’

S&S:
- Rectal bleeding
- Diarrhoea
- Colicky pain
- Weight loss

Diagnosis:
- Appearance at colonoscopy
- Histological features
- Excluded infective causes of colitis

Complications:
- Erythema nodosum
- Pyoderma gangrenosum
- Arthritis
- Spondylitis
- ↑ risk of adenocarcinoma
- Toxic megacolon

Management:
- Mild: topical steroids
- Moderate-Severe: systemic steroids
- Sever fulminating disease: broad-spectrum antibiotics, i.v.fluids, steroids
- Colectomy
CONSTIPATION

‘Painful passage of hard infrequent stools’

Causes:

Organic common:
- Following acute febrile illness or transient superficial anal fissure

Organic uncommon:
- Hypothyroidism
- Hypercalcaemia
- Hirschsprung’s disease

Psychological:
- Forceful potty training
- Use of uncomfortable lavatories
- Psychological family stress

Children may:
1. Refrain from defaecation due to fear of associated pain
2. Rectum becomes full and overdistended
3. With time sensation of needing to defaecate is lost
4. Involuntary soiling

Signs:
- Abdominal mass
- Stool present down to anal margin

Management:
- Dietary fluid and fibre.
- Stool softeners (lactulose or docusate).
- Stimulant laxatives (sodium picosulphate or senna).
- High volumes of oral polyethylene glycol solutions (Klean-Prep) given od until stools are liquid.
- Enemas or manual evacuation under anaesthetic.

Hirschsprung’s Disease

Pathophysiology:
- Absence of ganglion cells from the myenteric and submucosal plexuses of part of large bowel – Results in narrow, contracted segment.
- Abnormal bowel extends from rectum proximally ending in normally innervated dilated colon.
- 75% of cases – confined to recto-sigmoid
- 10% case – entire colon involved
**Notes by Harriet Wood**

**Presentation:**
- During neonatal period

**S&S:**
- Failure to pass meconium in first 24h of life
- Abdo distention
- Bile-stained vomiting

**Later childhood presentation:** Chronic constipation, abdo distention, growth failure.

**Occasionally infants present with...Hirschsprungs enterocolitis:**
- Life-threatening
- Sometimes due to Clostridium difficile infection

**Diagnosis:**
- Anorectal manometry
- Barium studies
- Suction rectal biopsy

\[\text{Demonstrate absence of ganglion cells and presence of large, acetylcholinesterase-+ve nerve trunks.}\]

**Management**
- Surgical – Involves initial colostomy followed by anastomosing normally innervated bowel to the anus.

**Important Note**
These notes were written by Harriet Wood, as a medical student in 2009. They are presented in good faith and every effort has been taken to ensure their accuracy. Nevertheless, medical practice changes over time and it is always important to check the information with your clinical teachers and with other reliable sources. Disclaimer: no responsibility can be taken by either the author or publisher for any loss, damage or injury occasioned to any person acting or refraining from action as a result of this information.

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