An Approach to Vomiting
Block 10

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Children vomit!

- Common
- Anxiety
- Need to find serious life-threatening disorders
The magnitude of the problem....

To illustrate the impact...
NVD at term, 3.08 kg, Apgars 9 and 10
Breastfed
Growing well
One month of age

- Admitted 2 months, 2.8 kg

What would you do?
- Na 125 mmol/l  [135-147]
- K 1.8 mmol/l  [4.1-5.3]
- Cl 82 mmol/l  [99-113]
- CO2 29 mmol/l  [18-29]
- Urea 7.5 mmol/l  [1.4-5]
- Creat 40 µmol/l  [14-34]

**HYPONATREMIC HYPOKALEMIC HYPOCHLOREMIC METABOLIC ALKALOSIS**

**UKE**

- “A hypertrophic pylorus is usually very quick and easy to see with US. Nothing of a HPS was visible in this baby. Although this does not exclude the diagnosis, it is highly unlikely”

**Abdominal sonar**
Barium meal
Explorative laparotomy

- Common cause vomiting, 1/500 births
- Male term infants
- Etiology unknown
  - Genetic component, increased risk siblings
  - Intrinsic defect enteric innervation
  - Deficiency nitric oxide, vasodilator vascular smooth muscle, facilitating contraction
  - Increase transforming growth factor alpha

Hypertrophic pylorus stenosis
Hypertrophic pyloric stenosis

- Nonbilious vomiting first weeks life
- Hungry, feeds eagerly
- Frequency and force increase
- Projectile vomiting
- Rhythmic retrograde peristalsis visible abdomen
- Olive shaped mass
- Ultrasound sensitive and specific
- "string-sign" bameal

Pyloromyotomy
6 months, 7 kg!

Complexity of the matter...

• 7y old boy
• Clusters of severe vomiting
  ◦ Once a month
  ◦ Frequency increase
  ◦ Associated severe dehydration
• Father migraine
EEG: Temporal lobe epilepsy

- Forceful expulsion
- Gastric/intestinal contents through mouth
- Preceded by nausea
- Autonomic nervous system
  - Salivation
  - Pupil dilatation
  - Sweating
  - Rapid heart rate
- Highly coordinated reflex process

**Definition**
Afferent input

- Chemoreceptor trigger zone
- Visceral afferents GIT
- Vagus and sympathetic nerves
  - Distention/mucosal irritation

Visceral afferents outside GIT
- Bile ducts, peritoneum, heart

Afferents extramedullary centres brain
- Psychic stimuli (fear, odour), vestibular disturbance, cerebral trauma

Vagus

\[ \downarrow \]

Sympathetic nerves

CONTROL
Vomiting centre
Medulla

\[ \downarrow \]

V,VII,IX,XII

\[ \downarrow \]

Sympathetic nerves
**Physiology**

- Controlled vomiting center in dorsolateral reticular formation of the medulla
- Afferent impulses transmitted via vagal and sympathetic pathways to the center
- Efferent motor impulses transmitted via N V, VII, IX, XII as well as spinal nerves supplying diaphragm and abdominal muscles
- Increased salivation, involuntary retching
- Violent descent diaphragm, constriction abdominal muscles with relaxation gastric cardia actively force gastric contents back up the esophagus

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- Regurgitation: effortless, gastric contents via oesophagus to oro-pharynx
- No associated autonomic symptoms
- GOR: effortless passing of gastric contents to oesophagus
- Completely different causes and management!

**Differentiate from REGURGITATION**
• Anatomic
• Infectious
• Neurological
• Metabolic
• Endocrinology
• Dietary
• Toxin
• Psychological

Differential diagnosis
- Frequently establish cause
- Prevent unnecessary investigations
- Narrow down the extensive list of possible causes

**History**

- Relative severity
- Duration of symptoms
- Frequency and quantity of vomitus
- Character of vomitus
- Associated symptoms
- Contents vomitus
- Relationship to other events
- Additional information

**Points History**
Relative severity

Temporal pattern
- Acute - infective
- Recurrent
  - Chronic – mucosal injury
  - Cyclical – abdominal migraine

Age of onset
- First week of life
- Early infancy
- Late infancy
- Childhood

Duration of symptoms
5d old Down’s, vomiting since birth

- Indicate severity of vomiting
- Frequent small spitts vs 3 large vomits each day
- Compare volume to size feed

Frequency and quantity
Character

- Vomiting
- Regurgitation
- Projectile vomiting

Associated symptoms

- Autonomic symptoms
  - Sweating, pallor, nausea, salivation
- Diarhoea
- Constipation
- Fever
- Headache
- Abdominal pain
• Undigested food
  ◦ Gastric outlet obstruction
• Bile
  ◦ intestinal obstruction
• Blood – fresh or coffee ground
  ◦ esophagitis, esophageal varices, gastritis, peptic ulcer, secondary swallowing nasopharyngeal blood

Contents vomitus

• Temporal relationship
  ◦ Time of the day
  ◦ Mealtimes

Relationship other events
- Other medication
- Thriving child vs failure to thrive
- Dehydration
- Jaundice
- Thrush, tonsillitis, OM
- Distention abdomen, peristaltic waves
- Hernial sites
- Palpation abdominal masses
- Acute abdomen

**Additional information**

- Auscultation bowel sounds
  - ↑ gatro-enteritis, obstruction
  - ↓ ileus
- Meningial irritation
- Signs raised intracranial pressure
  - Bradicardia, hypertention
- Persisten paroxysmal coughing
  - Pertussis
- Congestive cardiac failure
- Other diseases present?

**Additional information**
- HIV infected, not on HAART
- Admitted October 2010: Bronchiolitis
- Started vomiting in ward
- Readmitted December 2010
  ◦ Chronic vomiting
  ◦ Unable to tolerate any feeds
  ◦ Severe FTT

6 month old infant
Endoscopy

HIV and oesophageal disease

- ½-1/3 HIV+ patients
- Infection
  - Candidiasis 40% Asx
  - Herpes Simplex
  - CMV 10-40%
  - Histoplasmosis
  - HIV itself
  - EBV, HHV6
- Neoplasia
  - Lymphoma
  - Kaposi's
- GORD
- Pill oesophagitis – AZT
- Ideopathic oesophageal ulceration
Physical examination

- State of hydration
- Palpation abdomen: masses, abdominal distension, organomegaly
- Existence and site of tenderness or guarding
- Jaundice
- Non-GI causes

Danger signs in the vomiting child

- Bile-stained / feculent vomiting
- Blood in the vomit
- Projectile vomiting
- Dehydration
- Acid base and electrolyte abnormalities
- Weight loss
- Signs intestinal obstruction
- Fever, other signs systemic infections
- CNS symptoms (drowsiness, headache, signs raised intracranial pressure)
Special investigations

- Common causes seldom need further investigation
- Directed by clinical findings on history and physical examination
- Electrolytes
  - Projectile vomiting, hyponatremic hypochloremic alkalosis
  - Metabolic acidosis
- Urine microscopy, culture and sensitivity
- Urine and serum organic acids - ?
  Metabolic diseases

Obstruction:
AXR, sonar, contrast studies
Investigations...suspected GORD

**pH metry**

**pH-Impedance monitoring**
Early morning vomiting, no nausea...

Hematemesis: endoscopy
Management

- General
  - Maintain hydration
  - Prevent metabolic disturbances
  - Nutritional replenishment
- Specific treatment

Pharmacological agents

- Use with caution
- Limit to patients receiving chemotherapy and radiation
- Extrapyrimidal side effects
- Mask outward signs of disease
- Ondansetron
  - Selective serotoninergic 5HT3 receptor antagonist
  - no sedative effect
  - no extrapyramidal reactions
• FDA Black Box warning
  ◦ Irreversible tardive diskinesia

Metoclopramide

• Cyclic vomiting syndrome
• Motion sickness
• Postoperative vomiting
• Chemotherapy
• Abdominal migraine
• Functional nausea

Indications for anti-emetics
Motion sickness

- Travel by car, ship or airplane
- Nausea and dizziness precede vomiting
- Conflicting signals received by brain from visual and vestibular systems
- Peak childhood, resolve adolescence
- Simple treatments
- Medication
  - Diphenhydramine
  - Scopolamine patches
  - Meclizine
  - Promethazine

**Motion sickness**

Children vomit!

- Common
- Complex
- Recognize those in need!
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<th>Infectious causes</th>
<th>Endocrinologic disorders</th>
<th>Dietary causes</th>
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<tr>
<td>Malformations</td>
<td>Acute gastroenteritis</td>
<td>Diabetes melitus (especially with diabetic ketoads)</td>
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<tr>
<td>Malformations</td>
<td>Meningitis</td>
<td>Diabetes insipid</td>
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<td>Hypertrophic pyloric stenosis.</td>
<td>Septicemia</td>
<td>Congenital adrenal hyperplasia</td>
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<td>Hystolitria</td>
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<td>Acquired gastric outlet obstruction</td>
<td>Oral candidiasis</td>
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<td>Chronic granulocytic disease</td>
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<td>Meconium ileus</td>
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<td>Distal intestinal obstruction</td>
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<tr>
<td>Gastroesophageal reflux</td>
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<td>Torsicollis torsion</td>
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<tr>
<td>Malnutrition</td>
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*Frequently encountered causes of vomiting.*