

APPROACH TO NAUSEA AND VOMITING

CAN BE A MANIFESTATION OF GI DISORDERS BUT CAN ALSO REPRESENT A SECONDARY PRESENTATION OF NUMEROUS SYSTEMIC CONDITIONS:

- Severe pain (especially visceral)
- Systemic illness → AMI, sepsis, shock
- Definitive conditions be specific mechanisms:
 - Pregnancy → hormones
 - ↑d ICP → central
 - Toxins → homeostatic
 - Motion sickness → neuroendocrine
 - Chemotherapy → chemoreceptor trigger zone

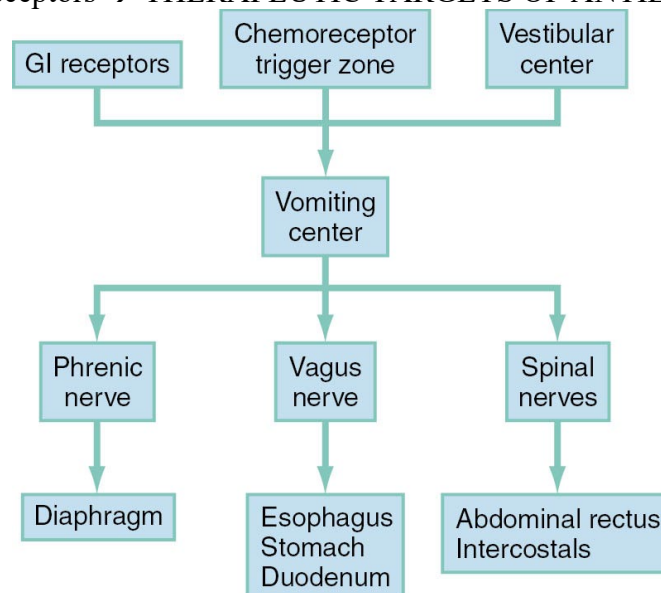
VOMITING CAN ALSO CAUSE SERIOUS SEQUELAE:

- Aspiration pneumonia
 - Esp in altered mental state or in those with respiratory symptoms after vomiting
- Mallory-Weiss tear
 - Tear through mucosa and submucosa as a result of forceful vomiting. Bleeding is usually mild, but accounts for up to 3% deaths from UGI bleeding
- Oesophageal rupture (BOERHAAVE'S SYNDROME):
 - Occurs following protracted and forceful vomiting, most often after heavy drinking and eating
 - Can occur with childbirth, defecation, seizures and heavy lifting
 - Perforation of all layers of the oesophagus occurring as a result of forceful retching
 - Overlying pleura is torn → passage of contents into mediastinum and thorax → subcutaneous emphysema
 - CXR can show pleural effusion, widened mediastinum, pneumothorax, pneumomediastinum
 - Mortality rate is 50% WITHOUT TREATMENT within 24 hours
- Volume depletion → through water and salt loss
- Metabolic derangement:
 - Metabolic alkalosis → produced by loss of hydrogen ions and MAINTAINED by volume contraction, hypokalaemia, chloride depletion, ↑aldosterone and hydrogen ion shift intracellularly
 - Hypokalaemia → primarily by loss of potassium in the urine due to metabolic alkalosis leading to large amounts of NaHCO₃ being delivered to distal tubule which ↑ aldosterone and reabsorption of sodium and excretion of large amounts of potassium in the urine

THE MOST COMMON CAUSES OF NAUSEA AND VOMITING ARE ACUTE GASTROENTERITIS, FEBRILE SYSTEMIC ILLNESSES AND DRUG EFFECTS

PATHOPHYSIOLOGY:

- The act of vomiting is divided into THREE PHASES:
 - NAUSEA → increased in tone in musculature of duodenum and jejunum and concomitant decrease in gastric tone → reflux of intestinal contents into the stomach
 - RETCHING → rhythmic, synchronous contractions of the diaphragm, abdominal muscles and intercostals against a closed glottis with a resultant ↑ in abdominal pressure and ↓ in intrathoracic pressure
 - VOMITING → forceful expulsion of gastric contents through the mouth
- Thought to be coordinated by the VOMITING CENTRE in the lateral reticular formation of the medulla → efferent pathways through the vagus, phrenic and spinal nerves → activated by a variety of afferent inputs, an important one is the CHEMORECEPTOR TRIGGER ZONE in the AREA POSTREMA (floor of fourth ventricle)
 - CTZ is rich with dopamine D2 receptors and also has serotonin receptors → THERAPEUTIC TARGETS OF ANTIEMETICS



RAPID ASSESSMENT AND STABILISATION:

- INITIAL ASSESSMENT BASED ON HAEMODYNAMICS AND IDENTIFYING CRITICAL CAUSES OR SEQUELAE OF VOMITING
- Information → duration of vomiting, ?blood in vomitus, symptoms of volume depletion
- Physical findings → level of consciousness, abdominal examination, rapid neurologic screen for focality, serial vital signs

HISTORY:

- DURATION:
 - ACUTE (<1/52) → obstructive, ischaemic, toxic, metabolic, infectious, neurologic, post-operative
 - CHRONIC → partial obstruction, motility disorders, neurologic conditions, pregnancy, functional
- TIMING:
 - If delayed > 1 hour post food → gastric outlet obstruction
- CONTENTS:

- Bile → patent connection between duodenum and stomach ruling out gastric outlet obstruction
- Undigested food → achalasia, oesophageal stricture, Zenker diverticulum
- Feculent material → distal bowel obstruction (most common) or gastrocolic fistula or long standing gastric outlet obstruction with bacterial overgrowth
- ASSOCIATED SYMPTOMS AND SIGNS:
 - Chronic headaches and intracranial lesions
- MEDICATIONS (including OTC)

PHYSICAL EXAMINATION:

Table 20-2 Physical Examination of the Patient with Nausea and Vomiting

ORGAN SYSTEM	FINDING	SUGGESTED DIAGNOSES
General	Poor skin turgor Dry mucous membranes	Dehydration
Vital signs	Fever	Gastroenteritis, cholecystitis, appendicitis, hepatitis
	Tachycardia/orthostatic changes	Bowel perforation Dehydration
HEENT	Nystagmus	Labyrinthitis Vertebrobasilar insufficiency Cerebellar infarct or bleed CPA tumor Increased ICP from CNS tumor or bleeding
Neck	Papilledema Goiter	Thyroid disease
Lungs	Rales	Pneumonia
Heart	Arrhythmia Murmur	Acute myocardial infarction
Abdomen	Abdominal distention Peristaltic waves High-pitched bowel sounds Decreased bowel sounds Hernias or surgical scars Peritoneal signs	Bowel obstruction, gastroparesis Gastric outlet obstruction Bowel obstruction Ileus Possible bowel obstruction Appendicitis, cholecystitis Perforated viscus
Neurologic	Abnormal mental status Cerebellar findings Cranial nerve findings	CNS pathology

CNS, central nervous system; CPA, cerebellopontine angle; HEENT, head, eyes, ears, nose, throat; ICP, intracranial pressure.

- In addition to above, loss of dental enamel seen in bulimia
- In children → bulging fontanelles (meningitis), projectile vomiting (pyloric stenosis), unusual odours (metabolic causes), visible bowel loops (bowel obstruction)

ANCILLARY STUDIES:

- FBC is of no discriminatory value
- Electrolytes → often not indicated, but protracted cases of vomiting may develop hypokalaemic, hypochloraemic metabolic alkalosis → do if vomiting for longer than 3 days or if significantly dehydrated
- Lipase (suspected pancreatitis)
- Urine pregnancy test in all women of child-bearing age
- Urinary ketones → support DKA or prolonged starvation state
- LFT
- Drug levels → digoxin, theophylline, salicylates (esp in elderly)
- AXR → only in suspected bowel obstruction or ileus → supplanted by CT
- US → cholelithiasis, pyloric stenosis, intussusception
- ECG → suspected AMI, ischaemia
- TFT

DIFFERENTIAL DIAGNOSIS → MASSIVE

ALMOST ANY ORGAN SYSTEM CAN BE INVOLVED → break down in to critical, emergent and non-emergent diagnoses

Table 20-1 Differential Diagnosis of Nausea and Vomiting

ETIOLOGIC CATEGORY	CRITICAL DIAGNOSES	EMERGENT DIAGNOSES	NONEMERGENT DIAGNOSES
Gastrointestinal (GI)	Boerhaave's syndrome Ischemic bowel GI bleeding	Gastric outlet obstruction Pancreatitis Cholecystitis/cholangitis Bowel obstruction/ileus Ruptured viscus Appendicitis Peritonitis Spontaneous bacterial peritonitis	Gastritis Gastroparesis Peptic ulcer disease Inflammatory bowel disease Biliary colic Hepatitis Gastroenteritis
Neurologic	Intracerebral bleed Meningitis	Migraine CNS tumor Raised ICP	
Endocrine	DKA	Adrenal insufficiency Uremia	Thyroid
Pregnancy		Hyperemesis gravidarum	Nausea and vomiting of pregnancy
Drug toxicity		Acetaminophen Digoxin Aspirin Theophylline	
Therapeutic drug use			Aspirin Antibiotics Erythromycin Ibuprofen Chemotherapy
Drugs of abuse			Narcotics Narcotic withdrawal Alcohol
Genitourinary		Gonadal torsion	Urinary tract infection Poisoning Nephrolithiasis
Miscellaneous	Myocardial infarction Sepsis	Carbon monoxide Electrolyte disorders Organophosphate poisoning	Motion sickness Labyrinthitis

CNS, central nervous system; DKA, diabetic ketoacidosis; ICP, intracranial pressure.

COMMON DISORDERS ASSOCIATED WITH VOMITING:

NAUSEA AND VOMITING OF PREGNANCY:

- Predominantly morning, typically starting in weeks 4-7, peaking 10-16 and disappears after 20.
- Very common (75%)
- Prognosis for mother and infant excellent
- Differentiate from HYPEREMESIS GRAVIDARUM:
 - 5% weight loss
 - Ketonuria
 - Associated with multiple gestation, molar pregnancy and nulliparity
 - Affects <1% pregnancies
 - Most studies have shown no adverse outcome for baby

GASTROENTERITIS:

- Fever, diarrhoea, cramping abdominal pain associated
- Vomiting and pain EARLY, followed by diarrhoea 24 hours later
- Can be confused with appendicitis early

GASTRITIS:

- Epigastric pain, belching, bloating, fullness associated

- NSAID, alcohol use common
- Can be associated with mild epigastric tenderness
- Removal of inciting agent with antacids

PEPTIC ULCER DISEASE:

- Epigastric pain in 90%
- Duodenal ulcer relieved by food, gastric → made worse
- Severe pain, think perforation
- Three major causes → Helicobacter, NSAIDs and hypersecretory states

BILIARY DISEASE:

- Pain (RUQ/epigastric) after fatty meal
- RUQ tenderness in most cases
- Normal temp, WCC, resolution of symptoms → BILIARY COLIC
- Fever, Murphy positive, ↑WCC and US → CHOLECYSTITIS

MYOCARDIAL INFARCTION:

- Associated with chest pain, SOB, diaphoresis, dizziness
- No diagnostic examination findings
- ECG critical
- NOT ALL PATIENTS GET CHEST PAIN:
 - Think in elderly, diabetics → may only get N+V, epigastric discomfort

DIABETIC KETOACIDOSIS:

- Polydipsia and polyuria early
- Without treatment → altered mental state and coma
- Triggers → infection, trauma, MI, surgery or non-compliance
- “Fruity” breath odour from acetone
- Tachypnoeic (attempts at compensation)
- Glucose, urine ketones and ABG
- As first presentation → nausea, vomiting and abdominal pain

PANCREATITIS:

- Epigastric pain radiating to the back
- Alcohol and gallstones most commonly
- Other precipitants ↑Ca, ↑ lipids, drugs (sulphurs, thiazides), ERCP
- Epigastric tenderness characteristically → may be associated with FRANK SHOCK in severe cases and paralytic ileus
- SEVERITY CRITERIA → Glasgow, Imrie.

APPENDICITIS:

- Classical presentation of migratory abdominal pain with localized RLQ tenderness. Fever may be present
- Anorexia common

BOWEL OBSTRUCTION:

- Frequent, intermittent cramping abdominal pain → higher level, more frequent.
- Abdominal distention, diffuse tenderness and high-pitched bowel sounds

- Search for herniae
- Adhesions, herniae and tumours account for 90% cases

PAEDIATRIC CONSIDERATIONS:

- The evaluation and management of paediatric patients depends on the age and likely causative disorders

Table 20-4 Etiology of Nausea and Vomiting in Pediatric Age Groups

ETIOLOGIC CATEGORY	NEWBORN	INFANT	CHILD	ADOLESCENT
Infectious	Sepsis, meningitis, UTI, thrush	Pneumonia, otitis media, thrush	Gastroenteritis	Gastroenteritis, URI
Anatomic	Atresia and webs, malrotation, stenosis, meconium ileus, Hirschsprung's disease	Pyloric stenosis, intussusception, Hirschsprung's disease	Bezoars, chronic granulomatous disease	PUD, superior mesenteric syndrome
Gastrointestinal	Reflux, overfeeding, gastric outlet obstruction, volvulus	Reflux, gastritis, milk intolerance	Appendicitis, pancreatic, hepatitis, other food intolerance	Achalasia, hepatitis
Neurologic	Subdural hematoma, hydrocephalus	Subdural hematoma	Neoplasia, migraine, Reye's syndrome, motion sickness, hypertension	Neoplasia, migraine, motion sickness, hypertension
Metabolic	Organic or amino acidemias, urea cycle defects, galactosemia, hypercalcemia, phenylketonuria, kernicterus	Hereditary fructose intolerance, disorders of fatty acid metabolism, uremia, adrenal hyperplasia, kernicterus	Diabetes, vitamin A excess	Diabetes, pregnancy, acute intermittent porphyria
Other	Idiopathic, cardiac failure	Rumination, cardiac failure	Cyclic vomiting syndrome, toxins, food poisoning, Munchausen syndrome by proxy	Psychogenic, anorexia

PUD, peptic ulcer disease; URI, upper respiratory infection; UTI, urinary tract infection.

MANAGEMENT:

- If a cause is found, treatment of this disorder takes precedence
- Rehydration (oral or IV as appropriate)
- Electrolyte replacement as needed
- PHARMACOLOGIC TREATMENT:
 - PHENOTHIAZINES:
 - PROCHLORPERAZINE, DROPERIDOL, HALOPERIDOL, PROMETHAZINE
 - Act via D2 blockade in CTZ
 - Common side effects → dystonic reactions, restlessness → treat with BENZTROPINE, DIPHENHYDRAMINE
 - SEROTONIN RECEPTOR ANTAGONISTS:
 - ONDANSETRON, GRANISETRON, TROPISETRON
 - Act at the AREA POSTREMA and in the GI tract
 - Associated with constipation and headache
 - PROKINETIC AGENTS:
 - Especially in gastroparesis, GORD, dysmotility
 - METOCLOPRAMIDE
 - Dopamine antagonist activity at CTZ and exerts anticholinergic and antiserotonin effects
 - Primary effect is increased gastric emptying
 - Restlessness, drowsiness and diarrhoea
 - ANTIHISTAMINES:
 - Esp in motion sickness and vertigo

- DIMENHYDRINATE, MECLIZINE → directly inhibit vestibular stimulation
- Blurred vision, drowsiness, dry mouth, hypotension → anticholinergic effect
- NOVEL AGENTS:
 - NEUROKININ-1 ANTAGONIST **APREPITANT**, blocks substance P.
 - Effective in chemotherapy patients