Signs and Symptoms in Gastrointestinal Diseases

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Gastrointestinal Symptoms

- Anorexia
- Dysphagia, odynophagia, globus
- Nause
- Regurgitation
- Vomiting
- Diarrhea
- Constipation
- Abdominal pain
- Gastrointestinal bleeding
- Jaundice (Related to cholestasis)

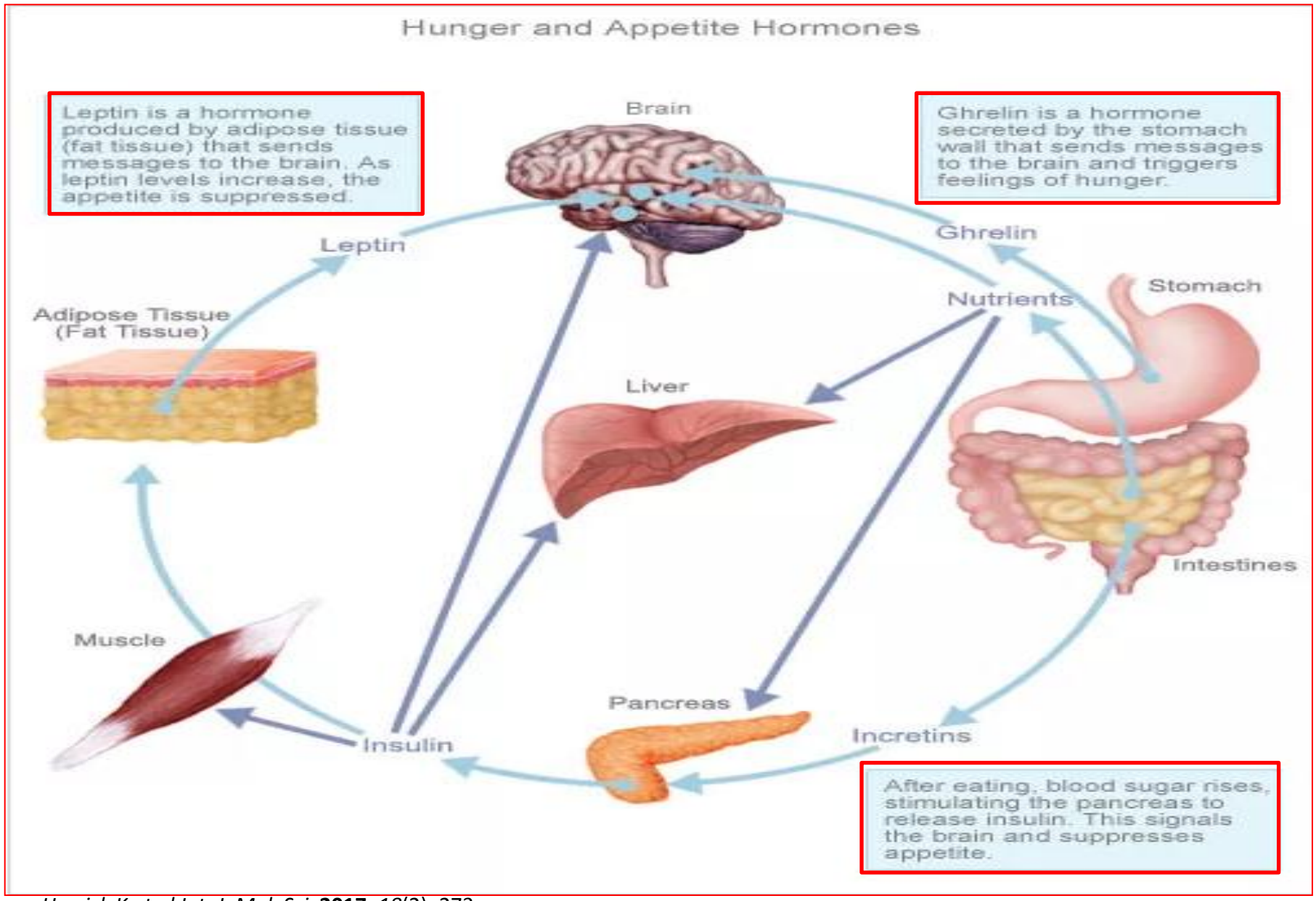
- Take a good history
- A detailed physical examination
- Related laboratory studies
- Related imaging studies

Anorexia

Anorexia = prolonged lack of appetite

- Hunger and satiety centers are located in the hypothalamus
- Satiety is stimulated by distention of the stomach or upper small bowel
- Other factors
  - Nutrient intake and digestion
  - Ghrelin
  - Leptin
  - Plasma glucose
  - *Hormones*

Anorexia



Howick K,et al.Int. J. Mol. Sci. **2017**, *18*(2), 273

Nausea

- An unpleasant and aversive feeling associated with the feeling that vomiting is imminent.

  - The autonomic signs include
    - Cutaneous vasoconstriction
    - Sweating
    - Dilation of pupils
    - Increased salivation
    - Tachycardia

Regurgitation

- Regurgitation is *effortless* expulsion of the gastric contents into the esophagus, and into the mouth (not expelled by force)
- Regurgitation is a result of reflux of gastric contents through an incompetent or immature lower esophageal sphincter (e.g in infants it is called “spit-up”).
- This is often a developmental process and resolves with maturity.
- Regurgitation should be differentiated from vomiting.

- *Dysphagia* ➔ Difficulty in swallowing
  - **Oropharyngeal dysphagia** (transition of food from mouth to esophagus impaired)
  - **Esophageal dysphagia** (transporting food bolus down the esophagus is impaired)
- *O***dynophagia**➔*Painful swallowing*
- **Globus➔ the sensation of something stuck in the throat without** a clear etiology.

Vomiting (emesis)

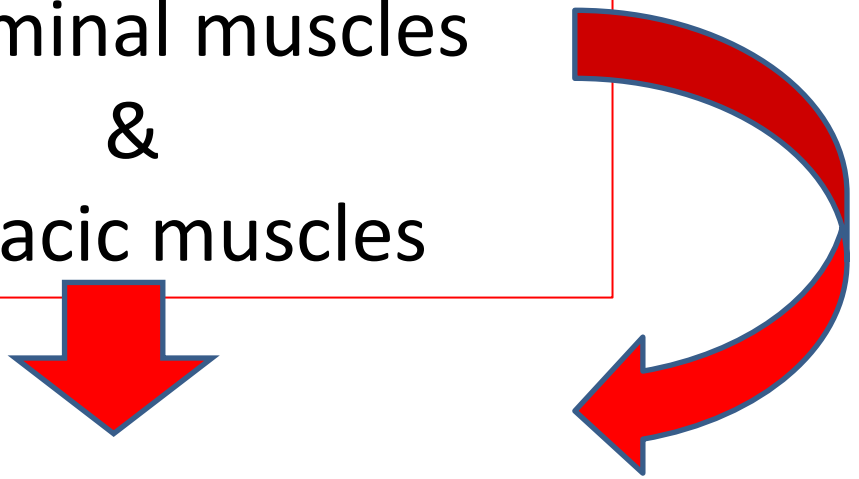
Vomiting is a complex reflex behavioral response to a variety of stimuli

- The emetic reflex has three phases:
  1) A prodromal period consisting of the sensation of nausea and signs of autonomic nervous system activation,
  2) Retching (gag)
  3) Forceful expulsion of the stomach contents through the oral cavity

Vomiting

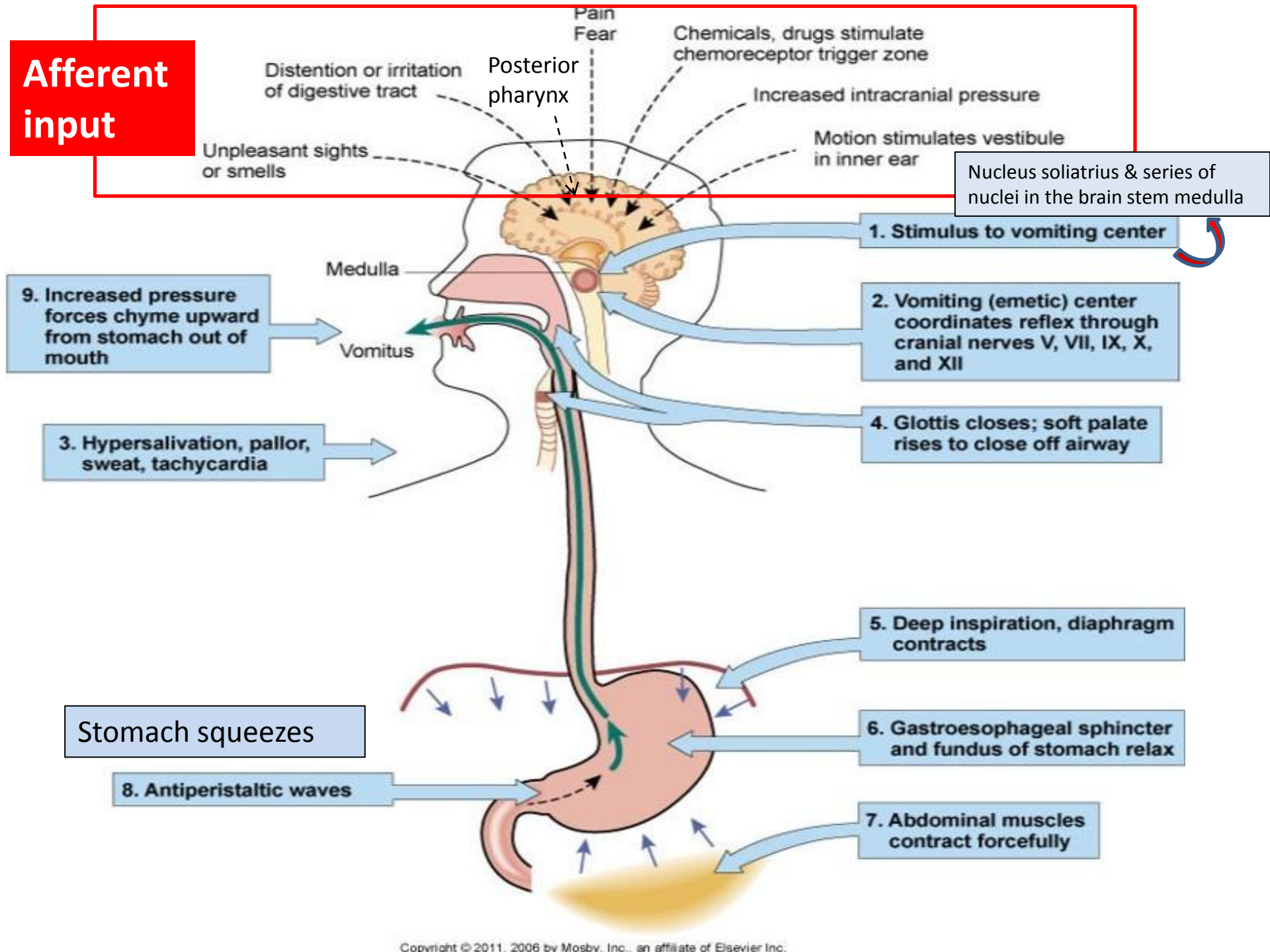
An involuntary, coordinated motor response of

Gastrointestinal tract
&
Abdominal muscles
&
Thoracic muscles



Forceful expulsion of <u>stomach contents</u>

A protective mechanism to rid the body of ingested toxins



Causes of vomiting

	Newborn	Infant	Child-Adolescent
Infectious	Sepsis Meningitis Urinary tract infection	Gastrooenteritis Acute otitis media Meningitis Sepsis Urinary tract infection Respiratory infection	Gastrooenteritis Acute otitis media Meningitis Sepsis Urinary tract infection Respiratory infection Sinusitis
Anatomic	Intestinal atresia/web Malrotation Volvulus Meconium ileus	Hypertrophic pilor stenosis Malrotation Volvulus Intussepsion	Volvulus Intussepsion Bezoars Surgical adehsions Superior mesenteric artery syndrome Incancerated hernia

Causes of vomiting

	Newborn	Infant	Child-Adolescent
Gastro-intestinal	**Gastro-esophageal reflux (GER)**	**GER/GERD** **Gastritis** **Pancreatitis** **Eosinophilic esophagitis**	**GER/GERD** **Gastritis** **Peptic ulcer** **Eosinophilic esophagitis** **Pancreatitis** **Hepatitis** **Cholecysitis** **Appendicitis** **Gastroparesis**
Neurologic	Subdural hematom Hydrocephalus	Hydrocephalus Increased intracranial pressure (neoplasm)	Migraine Increased intracranial pressure (neoplasm) Cyclic vomiting syndrome Intestinal pseudoobstruction

Causes of vomiting

	Newborn	Infant	Child-Adolescent
Metabolic	Organic acidemia Urea cycle defects Galactosemia	Urea cycle defects Fatty acid metabolism disorders	Diabetic ketoacidosis Acute intermittant porphyria
Other		Toxic ingestion Post-tussive	Toxic ingestion Food poisoning Post-tussive Bulimia Pregnancy (Adolescents)

- Age of the patient!!!
- Characteristics of vomiting
  - Duration
    - A few days?
    - Longer?
  - Color?
    - Billous → green
    - Bloody
      - Hematemesis
      - Fresh blood
  - Amount of vomit
  - Projectile?
    - Associated symptoms → headache, fontanale bulging, seizures
  - Timing in relation to feeds (immidiate or after 1-2 hours the meal)

Associated symptoms?

- Fever
- Abdominal pain
- Diarrhea
- Headache
- Heartburn
- Dysphagia
- Sore throat
- Otalgia
- Dysuria, fool smelling urine
- Jaundice
- Regurgitation
- Cough

Physical examination

All systems should be evaluated

- Vital findings (Pulse, blood pressure, respiration rate)
- Anthropometric measurements
  - Weight , height or length
- Signs of dehydration
  - Mouth dryness, lack of tears, wrinkled skin, sunken eyes and fontanel……
- Signs of infection
  - Hyperemia of tonsils, oropharenx, tympanic membrane…
- Signs of acute abdomen!!!
  - Defans, rigidity, rebound tenderness
- Signs of increased cranial pressure
  - Papilledema on ophtalmic examination
  - Abnormal neurolgical findings(malignancy)

Laboratory examination

- Whole blood count, acute phase reactans *(Erythrocyte sedimentaion rate, C- reactive protein)*
- Electrolytes, renal function test
- Urinalysis
- Liver enzymes
- Amylase or lipase
- If necessary ➔
  - Stool examination
  - Culture for blood, throat swab culture, urine,stool …
  - Lomber punction?

Imaging studies

- Abdominal X-ray *(in suspicious of surgical conditions)*
- Ultrasound *(in suspicious of surgical conditions)*
- Upper gastrointestinal follow through studies
- CT/ MR (abdominal, cranial)
- Upper gastrointestina endoscopy & biopsy

Frequency of defecation in children

Age	Frequency
Newborn	
•Breastfeeding	Mean 3-5 /day
•Formula	3-4 /day
Infancy	3-4/ day
Early childhood	1-2 /day
Adolescense	1 /day

Soft stools without straining

Stool volume

Age	Normal	Diarrhea
Infancy	5-10 g/kg/day	>10 g/kg/day
Older children	100g/day	> 200g/day

Amsterdam stool scala (infants and children who are not yet toilet trained)

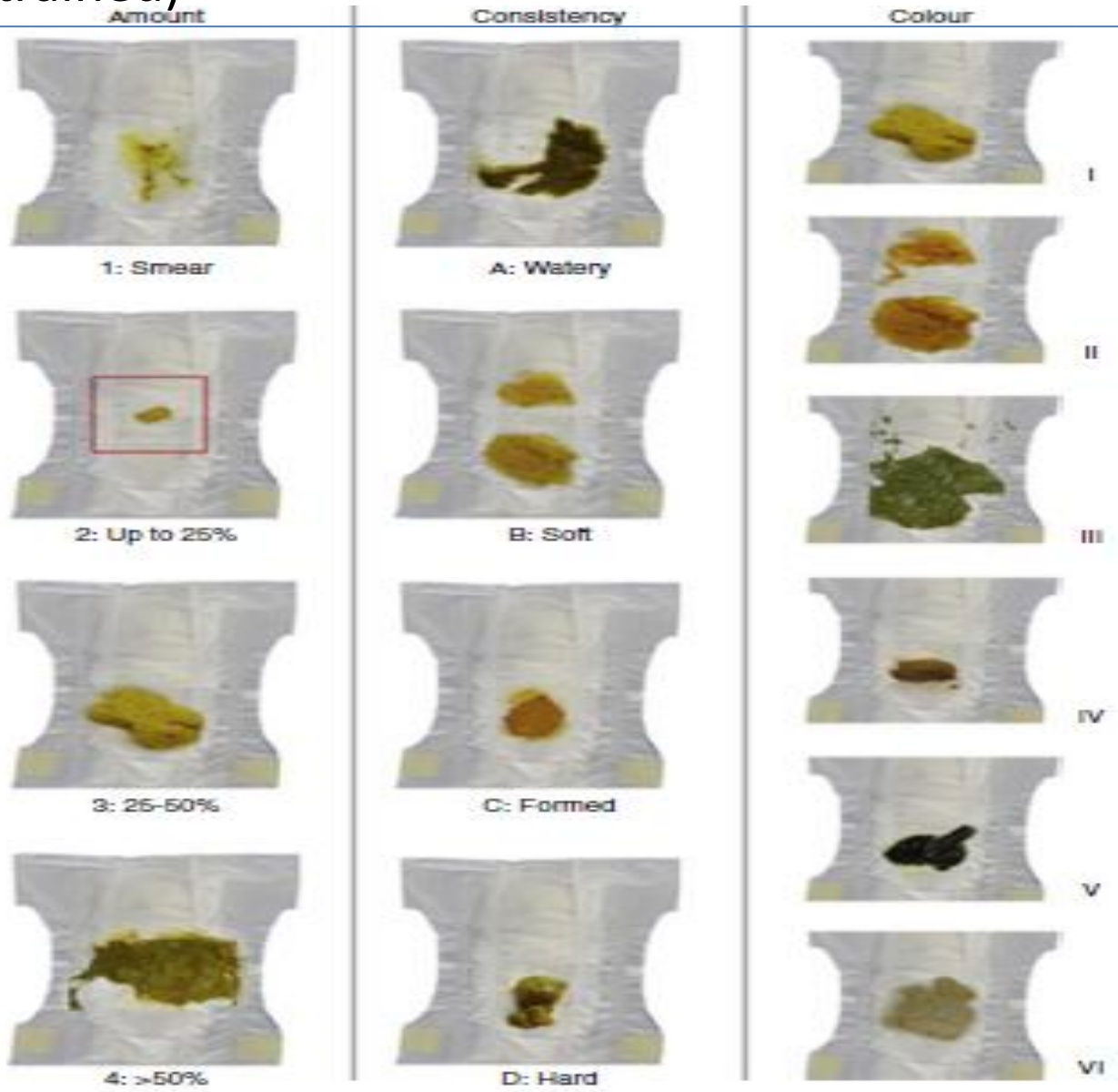


Figure 11-1. Amsterdam Stool Scale. Credit line: Infant stool form scale: development and results. *(Bekkali N, et al. | Pediatr 2009;**154**:521–6. Figure 2.) See also color plate.*

Bristol Stool Chart

Type 1		Separate hard lumps, like nuts (hard to pass)
Type 2		Sausage-shaped but lumpy
Type 3		Like a sausage but with cracks on the surface
Type 4		Like a sausage or snake, smooth and soft
Type 5		Soft blobs with clear-cut edges
Type 6		Fluffy pieces with ragged edges, a mushy stool
Type 7		Watery, no solid pieces. **Entirely Liquid**

First published: Lewis SJ, Heaton KW (1997) Stool form scale as a useful guide to intestinal transit time. Scandinavian Jorunal of Gastroenterology 32: 920–4

Diarrhea

Definition :

- Excessive loss of fluid and electrolyte in the stool➔ loose stools

- An impairment of intestinal solute transport and water absorption

- Normally, there is a passive water movement across intestinal membrane
- Water movement is determined by both active and passive fluxes of solutes sodium, chloride and glucose

Classification of diarrhea

Duration

Acute diarrhea

- Sudden onset
- < 14 days

Chronic or persistent diarrhea

- >14 days

Infectious gastroenteritis
Drug related (antibiotics)……

- Cystic fibrosis
- Inflammatory bowel disease
- Celiac disease……

Mechanisms of diarrhea

- Secretuary
- Osmotic
- Inflammatory
- Motility changes
- Decreased surface area

Mechanisms of diarrhea

Osmotic

- Poorly absorbable osmotically active solutes in the intestinal lumen
- Maldigestion, transport defects, ingestion of unabsorbable substances
  - Eg; Lactase deficiency, glucose- galactose malabsorption
- Watery, acidic (pH<5,5), and reducing substances (+), stops in fasting

Secretuary

- Increased electrolyte secretion / decreased absorbtion,electrolyte transport defect
  - Eg; Cholera…
- Watery, large volume,persists even with fasting

Inflammatory

- Bloody stools with mucus (colitis)
- Increased leucocytes in stool
- Eg: Inflammatory bowel disease, enteroinvasive infectios

Motility changes

Increased motility → Thyrotoxicosis
Decreased motility → Pseudoobstruction & bacterial overgrowth

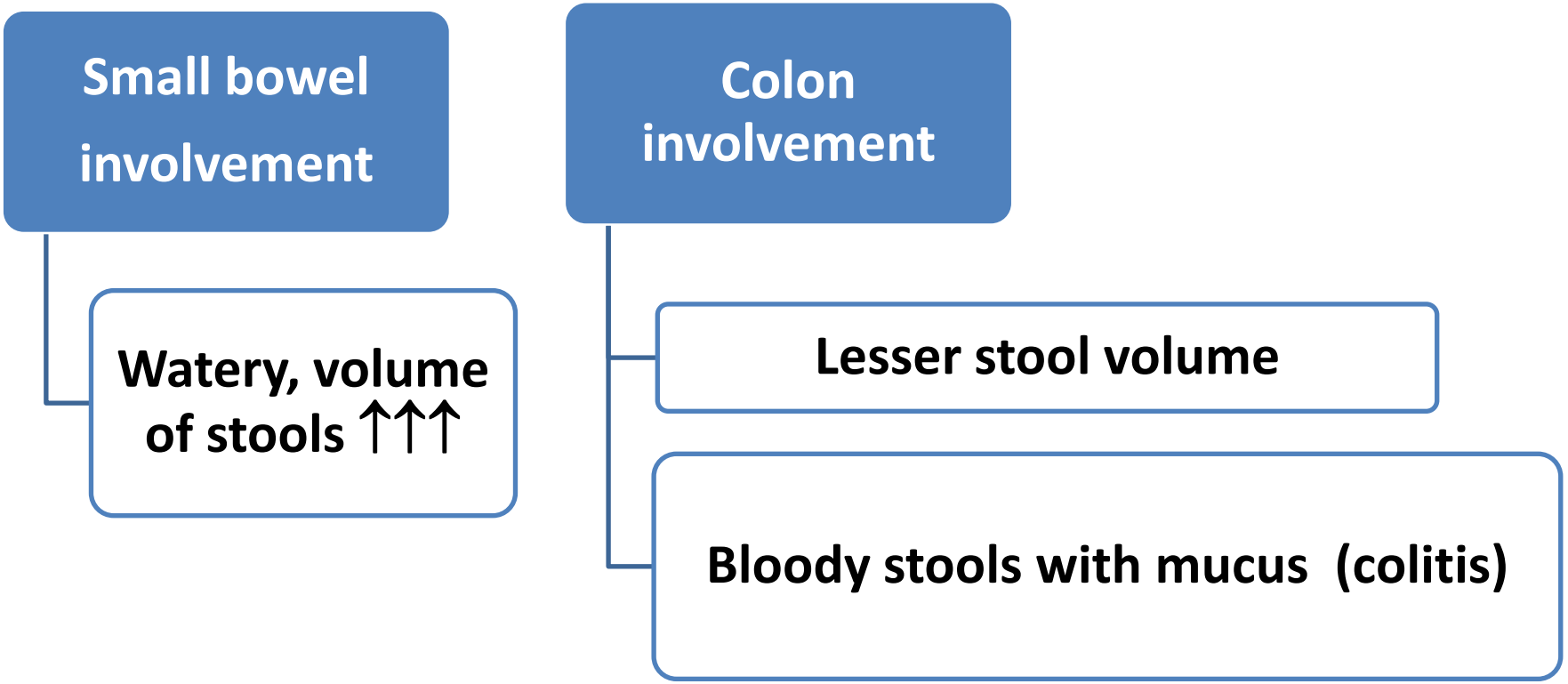
Decreased surface area

- Short bowel syndrome

Fatty diarrhea

- Malabsorbtion of maldigetion due to intestinal mucosal disease or pancreatic insufficiency

Diarrhea


Small bowel involvement
Watery, volume of stools ↑↑↑
Colon involvement
Lesser stool volume
Bloody stools with mucus (colitis)

INFANT	CHILD	ADOLESCENT
ACUTE		
Common		
Gastroenteritis (viral > bacterial > protozoal)	Gastroenteritis (viral > bacterial > protozoal)	Gastroenteritis (viral > bacterial > protozoal)
Systemic infection	Food poisoning	Food poisoning
Antibiotic associated	Systemic infection	Antibiotic associated
Overfeeding	Antibiotic associated	
Rare		
Primary disaccharidase deficiency	Toxic ingestion	Hyperthyroidism
Hirschsprung toxic colitis	Hemolytic uremic syndrome	Appendicitis
Adrenogenital syndrome	Intussusception	
Neonatal opiate withdrawal		

<1 y	1–4 y
Rotavirus	Rotavirus
Norovirus	Norovirus
Adenovirus	*Adenovirus*
Salmonella	*Salmonella*
	Campylobacter
	Yersinia

Infant	Child	Adolescent
CHRONIC		
Common		
Postinfectious secondary lactase deficiency	Postinfectious secondary lactase deficiency	Irritable bowel syndrome
Cow's milk or soy protein intolerance (allergy)	Irritable bowel syndrome	Inflammatory bowel disease
Chronic nonspecific diarrhea of infancy	Celiac disease	Lactose intolerance
Excessive fruit juice (sorbitol) ingestion	Cystic fibrosis	Giardiasis
Celiac disease	Lactose intolerance	Laxative abuse (anorexia nervosa)
Cystic fibrosis	Excessive fruit juice (sorbitol) ingestion	Constipation with encopresis
AIDS enteropathy	Giardiasis	
	Inflammatory bowel disease	
	AIDS enteropathy	

Rare, chronic

INFANT	CHILD	ADOLESCENT
Primary immune defects	Primary and acquired immune defects	Secretory tumor
Autoimmune enteropathy	Secretory tumors	Primary bowel tumor
IPEX and IPEX-like syndromes	Pseudoobstruction	Parasitic infections and venereal diseases
Glucose-galactose malabsorption	Sucrase-isomaltase deficiency	Appendiceal abscess
Microvillus inclusion disease (microvillus atrophy)	Eosinophilic gastroenteritis	Addison disease
Congenital transport defects (chloride, sodium)	Secretory tumors	
Primary bile acid malabsorption		
Factitious syndrome by proxy		
Hirschsprung disease		
Shwachman syndrome		
Secretory tumors		
Acrodermatitis enteropathica		
Lymphangiectasia		
Abetalipoproteinemia		
Eosinophilic gastroenteritis		
Short bowel syndrome		

Associated symptoms to diarrhea

- Fever +/- → Infectious, inflammatory
- Vomiting+/-
- Dysuria +/-
- Cough +/-
- Letargy +/-

- Dehydration signs
- Systemic examination→
  - Throat, ears, respiratory system…
  - Abdominal examination!!!
  - Neurological examination

Physical examination

All systems should be evaluated

- Antropometric measurements (weight, height/length)
- Vital signs (Pulse, blood pressure, respiratory rate)
  - Tachycardi, tachypnea
- Signs of dehydration
  - mouth dryness, lack of tears, wrinkled skin, sunken eyes and fontanel……
- Signs of infection
  - Hyperemia of tonsils, oropharenx, tympanic membrane…
- Signs of acute abdomen!!!
  - Defans, rigidity, rebound tenderness

Laboratory examination

- Whole blood count, acute phase reactans (ESR, C-reactive protein)
- Electrolytes (HCO_3), renal function tests
- Urinalysis
- Stool examination for parasites, leucocyte, erythrocyte
- Bloody stools➔ Stool culture
- If necessary;
  - Stool PCR for virus
  - Culture for blood, throat swab culture, urine …
- Etiological evaluations for chronic diarrhea

Imaging studies

- Abdominal X-ray *(In suspicion of acute abdomen)*
- Ultrasound *(In suspicion of acute abdomen)*

Abdominal pain

- Abdominal pain is one of the most common complaints in children, accounting for approximately 15% of all children evaluated in pediatric emergency units.
- It is important to differentiate abdominal pain that requires prompt surgical intervention from pain due to nonsurgical conditions
- The evaluation and management of abdominal pain varies depending on the severity and character of the pain, associated symptoms, age, gender, and the physical examination of the child.
- The sensation of abdominal pain is transmitted to the central nervous system via somatic and visceral afferent fibers.

Abdominal pain

- Two types nerve fibers transmit painful stimuli in the abdomen
  - *A fibers* mediate sharp localized pain ➔from skin and muscle
  - *C fibers* transmit poorly localized, dull pain➔from viscera, peritoneum and muscle
- These afferent fibers have cell bodies in the dorsal root ganglia, and some axons cross the midline and ascend to the medulla, midbrain, and thalamus.
- Pain is perceived in the cortex of the postcentral gyrus, which can receive impulses arising from both sides of the body.
- Perception of these painful stimuli can be modulated by input from both cerebral and peripheral sources(psychologic factors)

Abdominal pain

- 1) Somatic (Parietel) pain
- 2) Visceral (Splanchnic) pain
- 3) Referred pain

Abdominal pain-**Visceral pain**

- Visceral pain receptors are located on the serosal surface, in the mesentery, within the intestinal muscle, and the mucosa of hollow organs.
- These pain receptors respond to mechanical and chemical stimuli, such as stretching, tension, and ischemia.
- Tissue congestion and inflammation tend to sensitize nerve endings and lower the threshold for stimuli,because visceral pain fibers are unmyelinated C-fibers, and enter the spinal cord bilaterally at several levels, visceral pain is usually dull, poorly localized, and perceived in the midline.
- The pain and tenderness are not felt over the site of the disease process.

Painful stimuli originating in➔

The liver, pancreas, biliary tree, stomach, upper bowel from the distal small bowel, cecum, appendix, or proximal colon → Epigastrium

The distal small bowel, cecum, appendix, or proximal colon → Umbilicus

The distal large bowel,urinary tract, or pelvic organs suprapubic → Suprapubic

Renal or ureteral → Flank

The cecum, ascending colon, and descending colon sometimes is felt at the site of the lesion because of the short mesocecum

Abdominal pain- **Somatic pain**

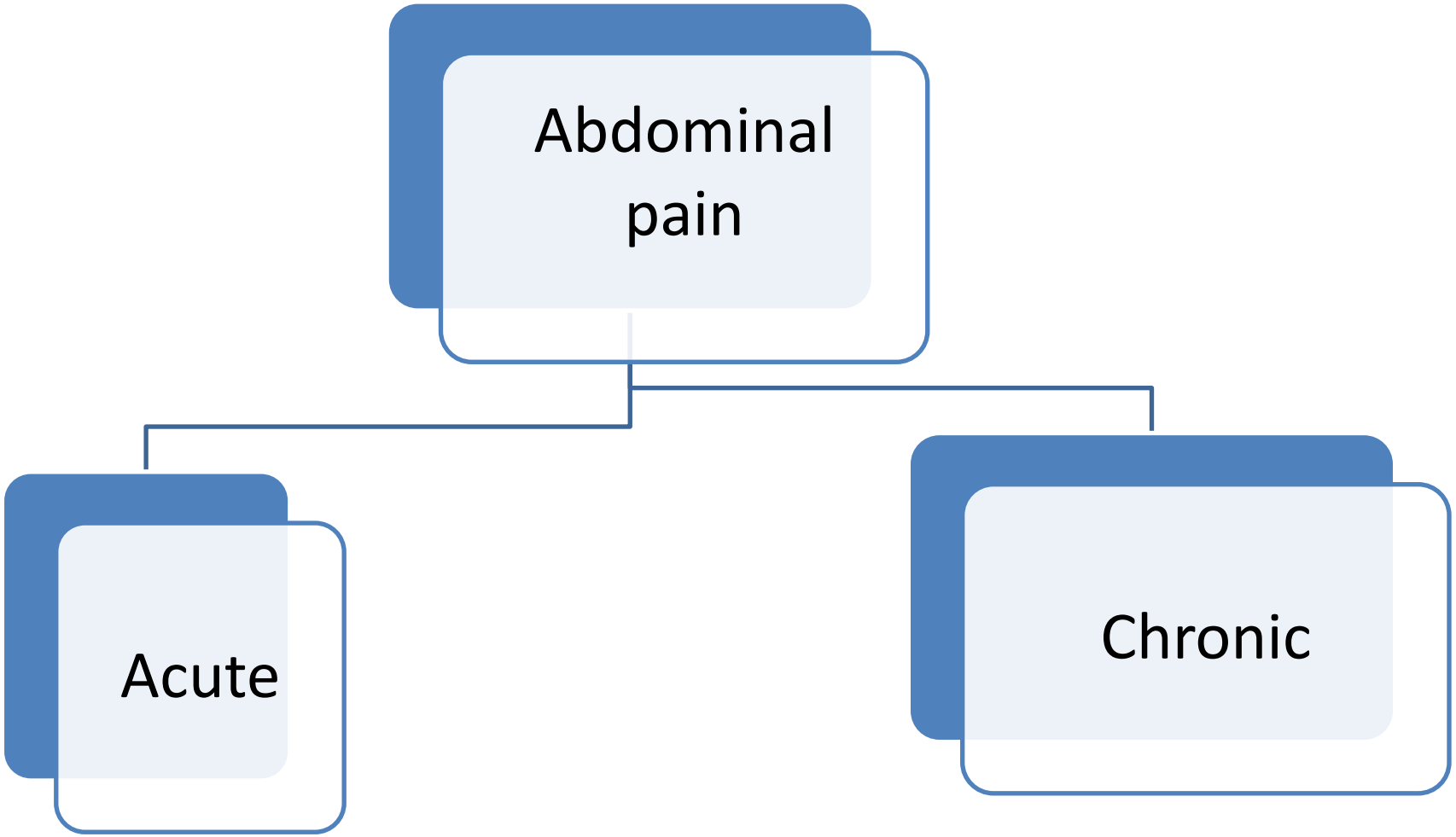
- Somatoparietal pain receptors are located in the parietal peritoneum, the muscle, and the skin.
- Pain resulting from inflammation, stretching, or tearing of the parietal peritoneum is transmitted through myelinated A-δ fibers to specific dorsal root ganglia, on the same side and at the same dermatomal level as the origin of the pain.
- Somatoparietal pain is characterized by sharp, more intense, and more localized sensation.
- **Coughing, moving.. etc** aggravate the pain

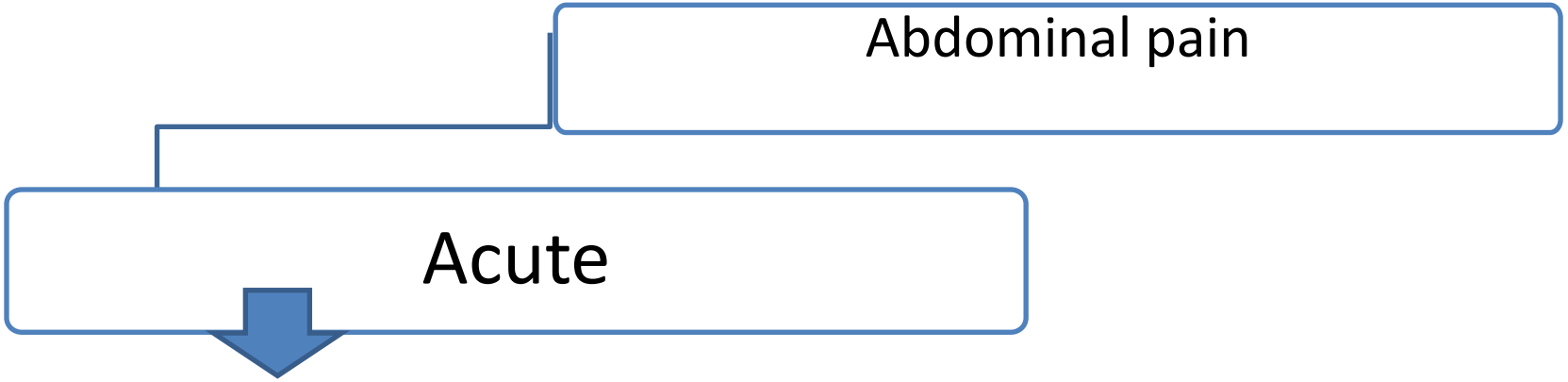
Abdominal pain-**Referred pain**

- **Referred pain from extraintestinal locations, from shared central** pathways for afferent neurons from (shared spinal cord level for afferent neurons) from different sites.
- It results from shared central can give rise to abdominal pain, as in pneumonia when the parietal pleural pain is referred to the abdomen (the T9 dermatome distribution is shared by the lung and the abdomen)
- Inflammatory conditions that affect the diaphragm can be perceived as pain in the shoulder or lower neck area (spinothalamic tracts at the C4 vertebra)
- Referred pain is well localized but felt in distant areas of the same cutaneous dermatome as the affected organ.

As an example of stimuli that provoke pain ;

- In the gut➔ tension or stretching
- Inflammatory lesions (lower the pain threshold*)
- Ischemia➔ released tissue metabolites near nerve endings


Abdominal pain
Acute
Chronic



- Pain of sudden onset
  - Likely associated with colic, perforations, and acute ischemia (eg, torsions, volvulus, mesenteric ischemia…).
- Pain of slower onset
  - Generally associated with inflammatory conditions such as appendicitis, pancreatitis, and cholecystitis.

Colic ➔spasms of a hollow muscular viscus (eg, biliary tree, pancreatic duct, gastrointestinal tract, urinary system, uterus, and fallopian tubes

➔usually secondary to an obstructive process

➔episodic severe cramping with intervals when the pain is absent or markedly ↓

DISEASE	ONSET	LOCATION	REFERRAL	QUALITY	Associated symptoms
Pancreatitis	Acute	Epigastric, left upper quadrant	Back	Constant, sharp, boring	Nausea, emesis, tenderness
Intestinal obstruction	Acute or gradual	Periumbilical-lower abdomen	Back	Alternating cramping (colic) and painless periods	Distention, obstipation, emesis, increased bowel sounds
Appendicitis	Acute (1-3 days)	Periumbilical, then localized to lower right quadrant; generalized with peritonitis	Back or pelvis if retrocecal	Sharp, steady	Anorexia, nausea, emesis, local tenderness, fever with peritonitis
Intussusception	Acute	Periumbilical-lower abdomen	None	Cramping, with painless periods	Hematochezia, knees in pulled-up position
Urolithiasis	Acute, sudden	Back (unilateral)	Groin	Sharp, intermittent, cramping	Hematuria
Urinary tract infection	Acute	Back	Bladder	Dull to sharp	Fever, costovertebral angle tenderness, dysuria, urinary frequency
Pelvic inflammatory disease	Acute	Pelvis, lower quadrant	Upper thigh	Aching, peritoneal signs	Vaginal discharge, fever
Small bowel obstruction	Acute to subacute	Periumbilical	None	Cramping diffuse	Emesis and obstipation
Ruptured ectopic pregnancy	Acute sudden	Pelvis, lower quadrant	None	Sharp, intense, localized	Vaginal bleeding, shock

Acute abdominal pain

- A careful history
- Ill-appearing child with abnormal vital signs
- The abdomen should be observed, auscultated, and palpated for;
  - Color, echymosis, erosions, rash….
  - Distension
  - Bowel sounds
  - Rebound tenderness, defence or abdominal rigidity (peritoneal irritation)
  - Ascites, organomegaly, masses

- The examiner should gently palpate less painful sites, then the most tender area.

Abdominal pain

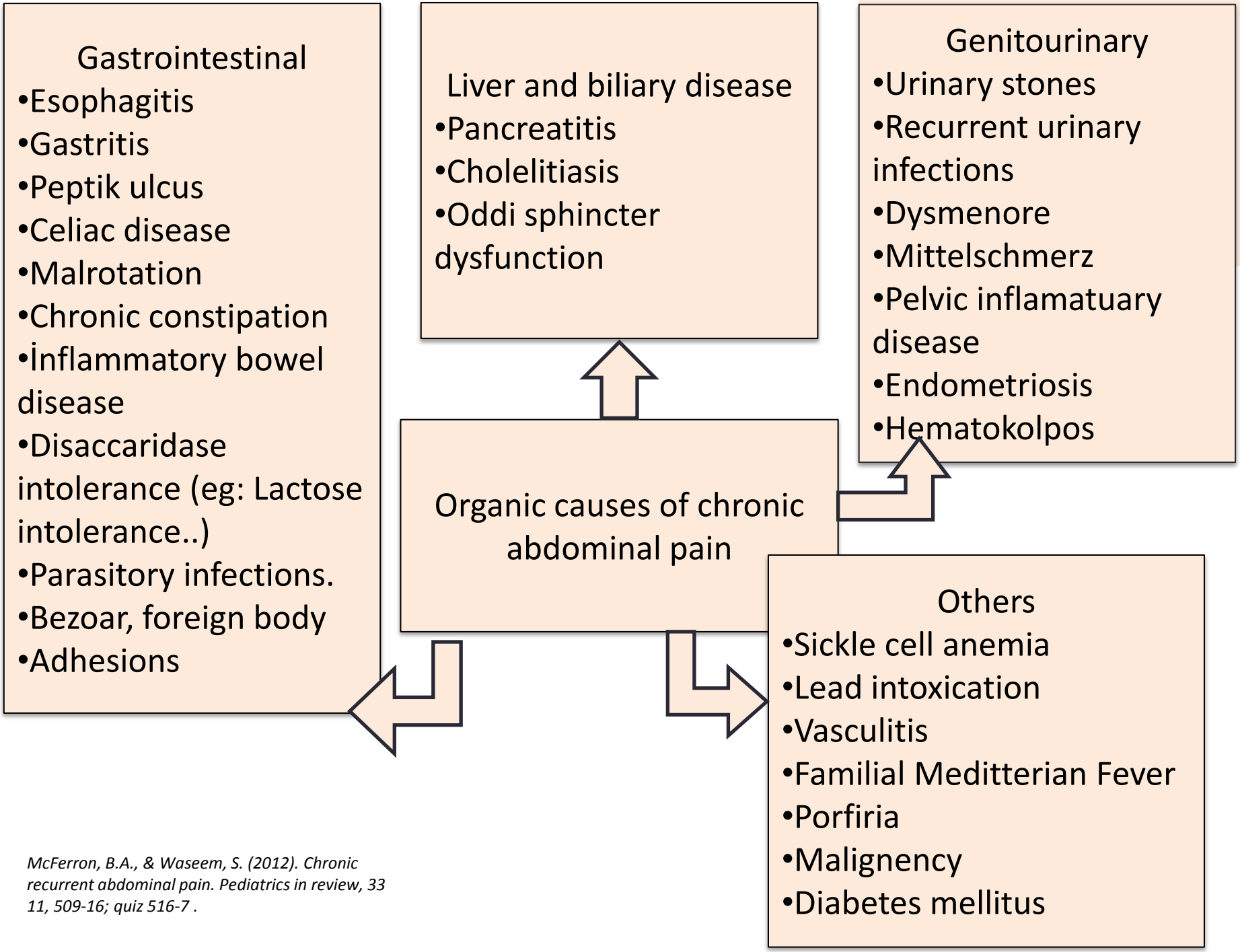
Chronic

•Chronic (recurrent) abdominal pain is characterized by intermittent or persistent pain that occurs over a period longer than 2 months.

Organic (10-25%)

- Infectious
- Inflammatory
- Metabolic
- Anatomical
- Neoplastic

Functional abdominal pain disorders (75-90%)



McFerron, B.A., & Waseem, S. (2012). Chronic recurrent abdominal pain. Pediatrics in review, 33 11, 509-16; quiz 516-7 .

Abdominal pain

Chronic

•Chronic (recurrent) abdominal pain is characterized by intermittent or persistent pain that occurs over a period longer than 2 months.

Functional abdominal pain disorders (FAPD) (75-90%)

•FAPD is a feature of functional gastrointestinal disorders

•No know anatomical, histological, or any other“organic” etiology

•Functional abdominal pain disorders include:

- *Irritable bowel syndrome (IBS)*
- *Functional dyspepsia*
- *Abdominal migraine*
- *Functional abdominal pain (FAP) not otherwise spesified*

Abdominal pain in children

Abdominal pain should be evaluated by considering;

- Age
- Location and radiation of the pain
- Duration of the pain
  - How long time does the pain exist?
  - How often is the pain coming?
  - How long does it take when it begins?
- Exacerbating or reliefing factors
- Relation to feeding or any specific food
- Relation to defecation
- Does the pain wake up at night?

- Associated symptoms
  - Vomiting
  - Diarrhea
  - Constipation
  - Chest pain, headache
  - Fever
  - Arthritis, arthralgia
- Medical and familial history
- Physical examination findings

Laboratory examination

- Whole blood count, acute phase reactans *(Erythrocyte sedimentaion rate, C- reactive protein)*
- Electrolytes, renal function test
- Liver enzymes
- Amylase or lipase
- Urinalysis
- If necessary ➔
  - Stool examination
  - Culture for blood, throat swab culture, urine,stool …

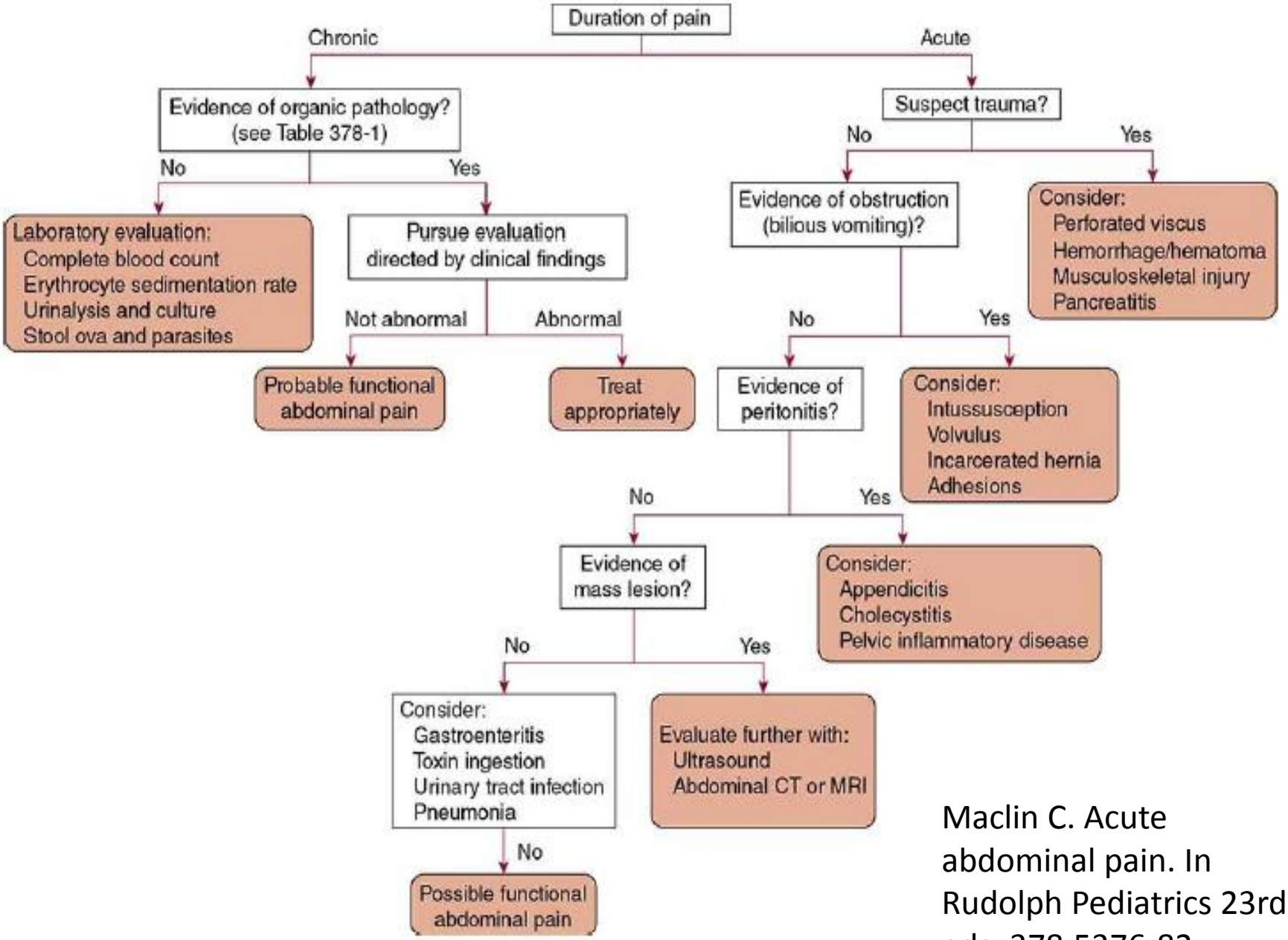
Imaging studies

- Abdominal X-ray *(in suspicious of surgical conditions)*
- Ultrasound *(in suspicious of surgical conditions)*
- If necessary ➔
- Upper gastrointestinal follow through studies
- CT/ MR (abdominal, cranial)
- Upper gastrointestina endoscopy & biopsy

Alarm symptoms ➔ Organic causes should be considered

- Abdominal pain than wakes the child from sleep
- Gastrointestinal bleeding
- Dysphagia, odynophagia
- Growth retardation or weight loss
- Delayed puberty
- Chronic diarrhea
- Significant vomiting
- Fever, arthralgia, uveit, aphtous ulcers
- Perianal disease
- Familial history of inflammatory bowel disease, peptic ulcer or celiac disease
- Laboratory abnomalities
  - Anemia
  - Elevated acute phase recatans(Erythrocyte sedimanetation rate, C-reactive protein, leucocyte & platelet count)
  - Hypoalbuminemia
  - Elevated amylase, lipase
  - Abnormal liver function or renal function tests

Abdominal pain in children (flowchart)



Maclin C. Acute abdominal pain. In Rudolph Pediatrics 23rd eds; 378;5376-82.

Constipation

- Stool consistency↑ (hard stool)
- Stool frequency↓
- Difficulty in passing the stool (painful)

There are 3 periods in life when infants and children are particularly vulnerable to develop constipation➔Functional constipation

- Infancy➔ Introduction of solid foods
- Toilet training
- At school (unhygienic or not private school toeilets)

} Constipation development↑

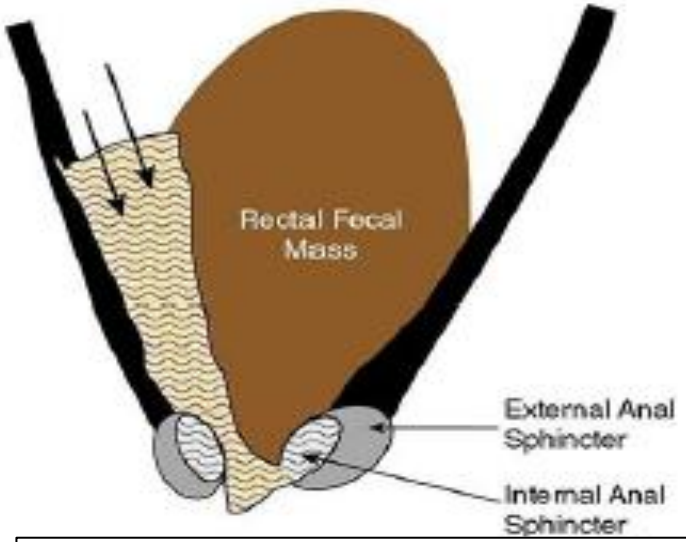
Functional constipation consists ~%90-95 of childhood constipation

No know anatomical, histological, or any other“organic” etiology.

Painful defecation!
Postpone defecation, withholding stool

The rectal mucosa absorbs water from the fecal mass

Retained stools become progressively more difficult to evacuate



- Rectal wall becomes stretched (megarectum develops)
- Loss of rectal sensation
- Overflow fecal incontinence

Altaf M, Sood MR. Approach to the Child with Constipation and Fecal Incontinence . In Rudolph Pediatrics; 23eds: Chapter 381: 5417-5429

Organic causes of constipation (%5-10 of childhood constipation)	
Anorectal malformations	•Anterior displaced anus (Newborn & early infancy) •Anal stenosis (Newborn & early infancy) •Pelvic mass (sacral teratoma)
Intestinal nerve/ muscle disorders	Hirschsprung's disease ⇨ Meconium passage is delayed for >24 hour Intestinal neuronal dysplasia
Neuropatic and developemental disorders	Spinal cord abnormalities (Tethered cord, meningomyelosel) Cerebral palsy
Endocrine and metabolic disorders	Hypothyroidism Diabetes mellitus Hypercalcemia Hypokalemia Cystic fibrosis ⇨ meconium plug in neonate Celiac disease
Drugs	Opiates, anticholinergics, phenobarbitone, vincristine, vitamin D intoxication, lead
Other	Sexual abuse Anorexia nervosa

Symptoms

- Presentation age
- Stool
  - Frequency
  - Consistency
  - Shape
- Stool witholding,retentive posturing
- History of anal fissure/ blood on toilet paper
- Dysuria, history of urinary tract infection
- Diet
- Use of any medication

Physical examination

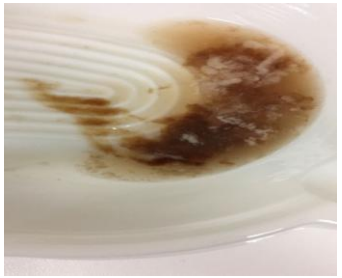
- Antropometric measurement
- Abdominal palpation (fecal mass)
- Lumbosacral region
- Perianal examination
  - Position of the anus
  - Evidence of fecal incontinence
  - Skin irritation, eczema, fissures, hemorrhoids, and signs of possible sexual abuse.
- Anorectal digital examination ➔
  - Anal tone
  - Size of the rectum

Gastrointestinal (GI) Hemorrhage

- Bleeding can occur anywhere along the GI tract, and identification of the site may be challenging
- **Hematemesis**
- **Melena**
- **Hematochezia**

Gastrointestinal Hemorrhage

- **Hematemesis** ➔Bleeding that originates in the esophagus, stomach, or duodenum (proximal to the ligament of Treitz (duodenojejunal junction)
- **When exposed to gastric or** intestinal juices, blood quickly darkens to resemble coffee grounds (dark brown) (blood is coagulated by gastric acid)
- Massive bleeding is likely to be red



Gastrointestinal Hemorrhage

Melena

- Black, dark stools of tarry consistency produced by the oxidation of heme by intestinal flora; as little as 50 mL of blood may result in melena
- It may persist for 3 to 5 days following resolution of the bleeding.
- Moderate to mild bleeding from sites above the distal ileum

TABLE 382-1 ETIOLOGY OF UPPER GASTROINTESTINAL BLEEDING BY PEDIATRIC AGE[a]

Newborn	Infant	Child/Adolescent
Swallowed maternal blood	Mallory-Weiss tear	Peptic ulcer disease
Vitamin K deficiency	Prolapse gastropathy	Erosive gastritis
Peptic ulcer disease	Vascular malformation	Mallory-Weiss tear
Vascular malformation	Anatomic duplication	Variceal bleed
Coagulopathy	Bowel obstruction	Caustic ingestion
Dietary protein intolerance	Mucosal webs	Vasculitis
	Foreign body	Inflammatory bowel disease
		Bowel obstruction
		Hemobilia
		Vascular ectasias
		Foreign body

[a]The table lists the most common causes of upper gastrointestinal bleeding in each age range, but each disorder may present at any age.

Noel R. Upper and lower gastrointestinal bleeding. In Rudolph Pediatrics; 23eds: Chapter 382: 5432-5441

Gastrointestinal Hemorrhage

Hematochezia

- **E**ither a fresh blood which originates from distal site of the bowel or massive hemorrhage above the distal ileum
- The passage of bright red blood or maroon colored blood in stools (rapidly bleeding small bowel lesions in which the transit of blood is too fast for complete oxidation)

- Currant-jelly stool (ischemic small bowel or proximal colonic lesions) (Eg: Intussusception)

https://images.app.goo.gl/Aw4GQ5acZxRXmLjE7

Lower gastrointestinal bleeding by pediatric age

Newborn	Infant	Child/Adolescent
Necrotizing enterocolitis	Anal fissure	Anal fissure
Malrotation with volvulus	Infectious colitis	Infectious colitis
Allergic proctocolitis	Allergic proctocolitis	Polyp
Hirschsprung disease with enterocolitis	Meckel diverticulum	Meckel diverticulum
Hemorrhagic disease of the newborn	Lymphonodular hyperplasia	Intussusception
	Malrotation with volvulus	Henoch-Schönlein purpura
	Hirschsprung disease with enterocolitis	Hemolytic uremic disease
	Anatomic duplication	Lymphonodular hyperplasia
	Immune deficiency	Inflammatory bowel disease
		Hemorrhoids
		Solitary rectal ulcer

*The table lists the most common causes of lower gastrointestinal bleeding in each age range, but each disorder may present at any age.

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History

- Onset and duration of bleeding
- Characteristics of bleeding
  - Appearance (Color)
  - Quantity
- Associated symptoms
  - Aphtous ulcers, abdominal pain, rashes, vomiting, swelling, headaches, neck pain, chest pain, diarrhea, fevers, bruising
- Medical history
  - Liver disease, portal vein trombosis, bleeding diatesis…
- History of travel?
- Exposure to toxins, animals, or potentially contaminated food or water source
- Ingestion of specific foods or medications (NSAI)
- Foreign body ingestion
- Family history (IBD, polip, peptic ulcer….)

Physical examination

- Vital Signs:
  - Pulse, blood pressure, urine output
- General appearance (well or ill), mental status
- Fever
- Head, eyes, ears, nose, and throat:
  - Trauma, scleral injection, petechiae, lip pigmentation, epistaxis, erythema or burns to posterior pharynx, bleeding
- Chest/Cardiovascular:
  - Tachycardia, murmur, capillary refill
- Abdomen:
  - Tenderness, splenomegaly, hepatomegaly, caput medusa, distention, ascites
- Rectal:
  - Gross blood, melena, tags, tenderness, fissure, fistula,swelling,hemorroids
- Dermatological:
  - Pallor, jaundice, rash, arteriovenous malformations, bruising, petechiae

Laboratory studies

- CBC (Hb!!, plt, WBC)
- Prothrombin time/partial thromboplastin time/INR
- Electrolytes and liver function tests
- Blood type and cross match
- Erythrocyte sedimentation rate (ESR), C-reactive protein (CRP)
- Stool culture (Shigella, Salmonella, Yersinia, Campylobacter, with *Escherichia coli O157:H7 assay)*
- Clostridium difficile toxins A&B, Cryptosporidium
- Entamobea histolica antigen
- Hemoccult and gastroccult testing

Jaundice- Cholestasis

Definition:

- Serum conjugated bilirubin is > 1 mg/dl if total bilirubin < 5 mg/dl
- Serum conjugated bilirubin is 15-20% of total bilirubin if total bilirubin > 5 mg/dl

Conjugated hyperbilirubinemia is NEVER NORMAL

Jaundice- Conjugated hyperbilirubinemia

History

- Prenatal
  - Infection (TORCH)
- Natal
  - Delivery time
  - Delivert type
  - Birth weight
- Acholic (pale) stools
- Consanguinity
- Family history

Physical examination

- Growth parameters
  - Weight, length and head circumstances
- Extension of icterius
- Cardiac murmur?
- Abdomen examination!
- Syndromic features

Laboratory

- Liver enzymes
- Bilirubin levels
- Protrombin time, INR
- Related infectious, metabolic and genetic tests

Abdominal USG

- **Biliary atresia**
- **Choledocal cysts**
- **Liver**
- **Spleen**