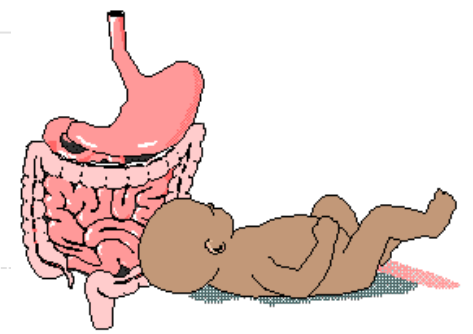
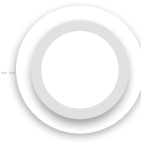
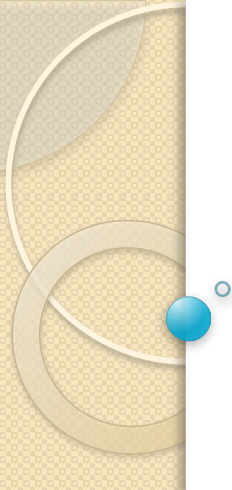




Common GI Problems of Infants and Children



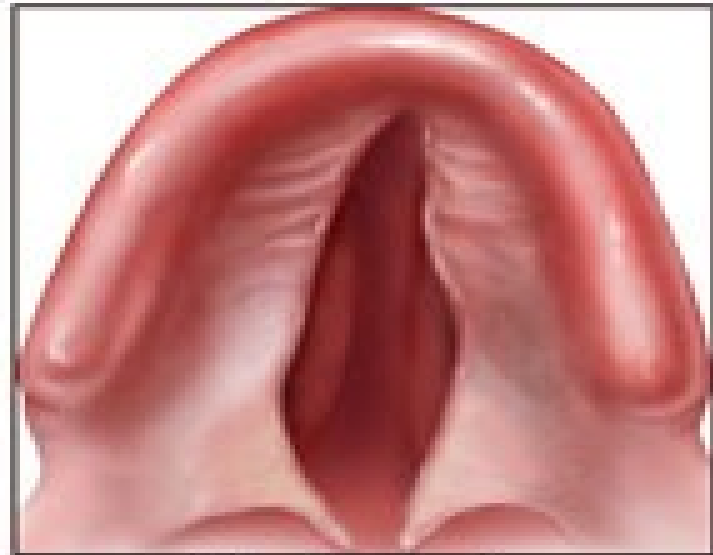
Cleft lip and Palate

Introduction

- “Cleft is an abnormal opening or a fissure in an anatomical structure that is normally closed.”
- “Cleft lip is the result of failure of parts of the lip to come together early in the life of a fetus.”
- “Cleft palate occurs when the parts of the roof of the mouth do not fuse normally during fetal development, leaving a large opening between the oral cavity and the nasal cavity.” (Kummer, 2008, p. 37)



Baby with cleft palate



Cleft palate



Baby with cleft lip

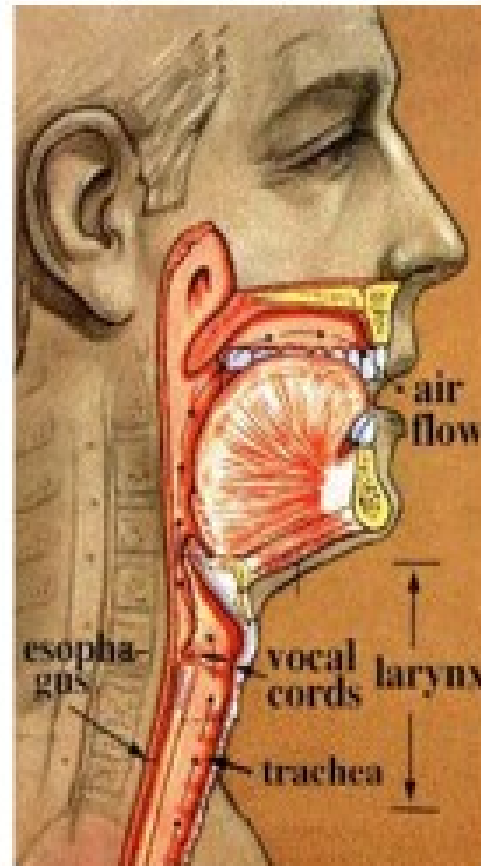
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- Cleft lip and/or palate is a common congenital birth defect (Nelson, Glenny, Kirk, & Caress, 2011).
- The prevalence of CL/P is approximately 1.7 per 1000 live birth worldwide.
- However, different studies show that prevalence of CL/P varies due to ethnic group, racial, geographical locations or gender (Monger, 2009).
- In Norway, the incidence is approximately 2 in 1000 live births

...

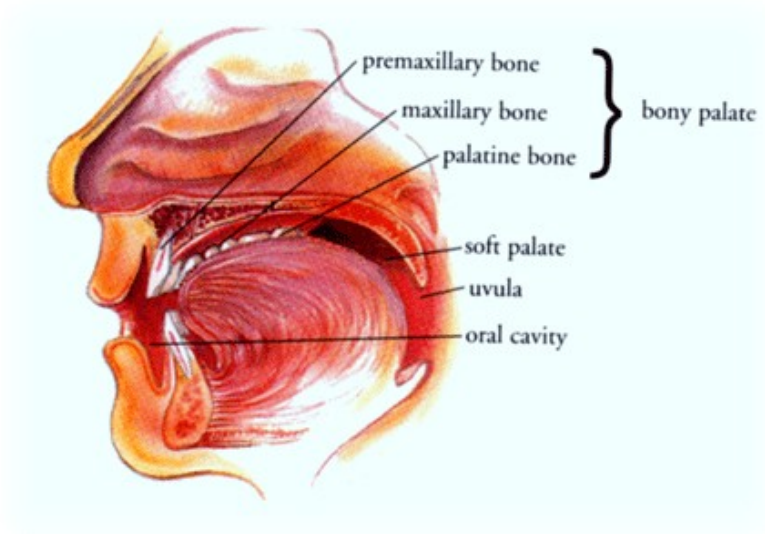
- Cleft lip and palate is result from failure of embryonic processes.
- Frontonasal process
 - Nose
 - Prolabium
- Maxillary processes on each side
 - Remainder of upper lip on each side.

Major Landmarks of the Vocal Tract



Disorders involving cleft lip and palate involve the lips, hard palate, and the velum(membrane, typically bordering a cavity).

The Palate



Anterior 2/3 is the hard palate

- Purpose is to separate the oral and nasal cavities

Posterior 1/3 is the soft palate

- Mucosal tissue and muscles

Anatomic Principles

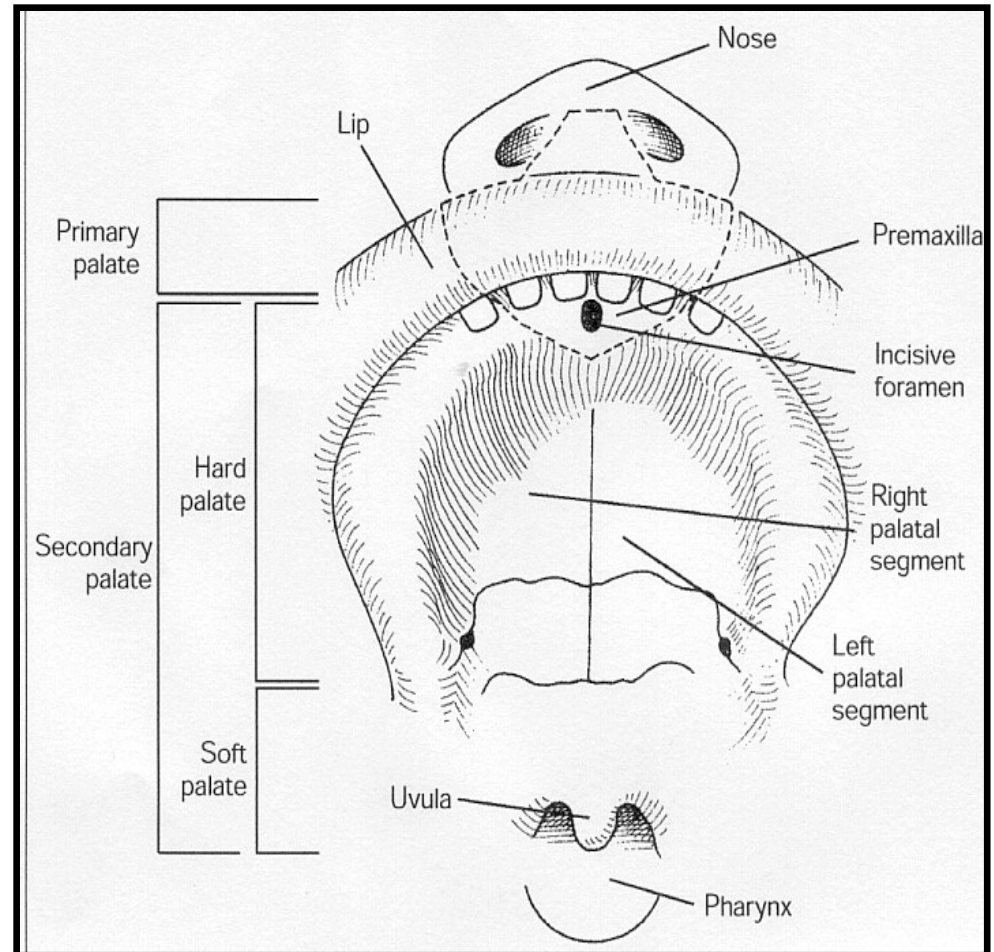
Normal Palate

Primary palate

Secondary palate

Soft palate

Hard palate



Embryologic Development of the Face and Palate

- Development of the face
 - Formed between the 5th and 8th weeks of gestation
 - Results from the fusion of
 - ✓ Two mandibular processes
 - ✓ One frontonasal process and two maxillary processes
 - Cleft lip occurs when the fusion process between the frontnasal masses and the

■ ■ ■

- Development of the secondary palate
 - Bony hard palate and the velum
 - Process and fusion occurs between the 8th and 12th week of gestation
- Problems or factors that prevent fusion of the palatal shelves result in an isolated cleft of the hard and/or soft palate

Epidemiology

- The most common congenital anomaly.
- Affects 1 in 750 births in USA.
- The incidence of cleft lip/palate varies among different populations
 - ▢ The most common in asians (1:500)
 - ▢ In whites (1:750)
 - ▢ The lowest in blacks (1:1000 or less)
- Cleft lip more often in boys (left side)(2 male:1 female)

Classification

- Based on alveolar arcus

(Davies- Ritchie 1922)

- Prealveolar (cleft lip)
- Postalveolar (cleft palate)
- Transalveolar (cleft lip and palate)

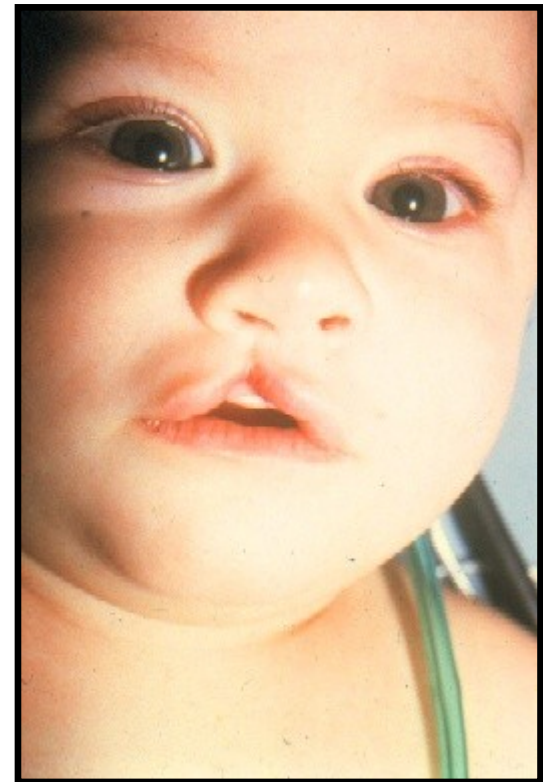
- Based on embryologic development

(Kernehan-Stark 1958)

- Primary cleft palate (anterior to incisive foramen)
- Secondary cleft palate (posterior to incisive foramen)

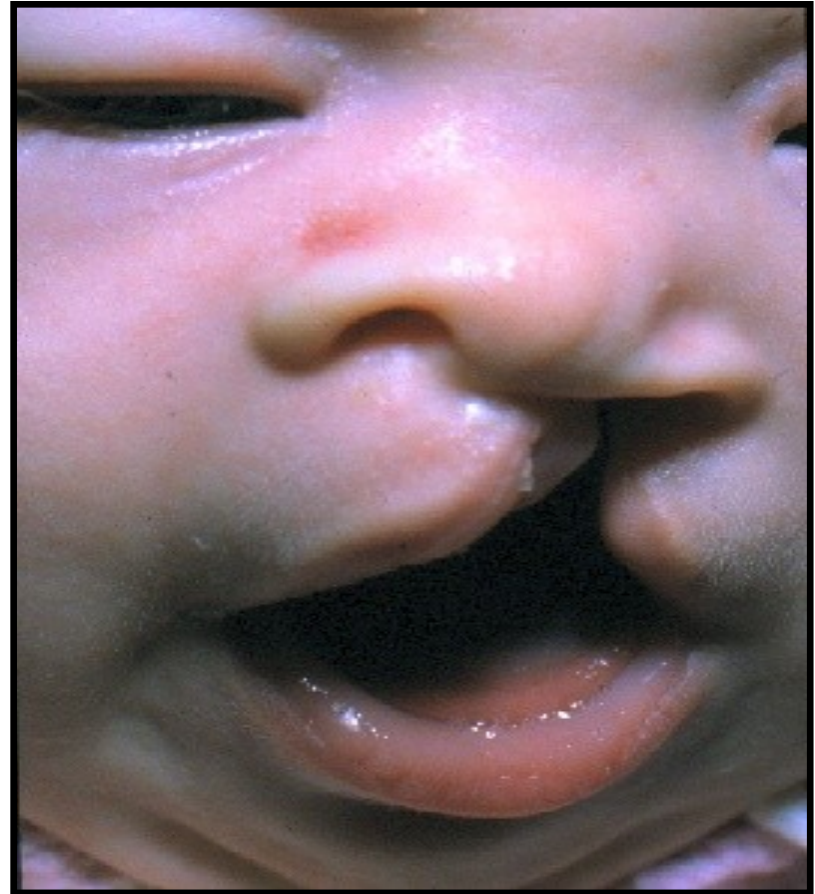
Isolated Incomplete

- Bilateral/Unilateral
- Intact skin/muscle between the lip and nose
- Less distortion brought on by abnormal muscle pull



Isolated Complete

- Bilateral/Unilateral
- Cleft runs entire length of lip to floor of nose
- Abnormal muscle pull distorts nose extensively and creates wide clefts between the lip segments



Cleft variants

Combined Clefts

Complete lip/palate



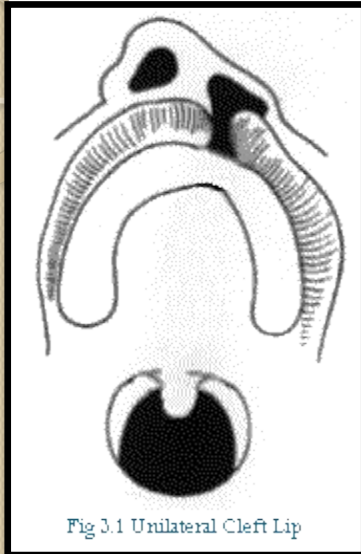
Incomplete
lip/palate



Clinical Aspects of Cleft Lip/Palate
Reconstruction

Alkan health science college

Iowa Classification

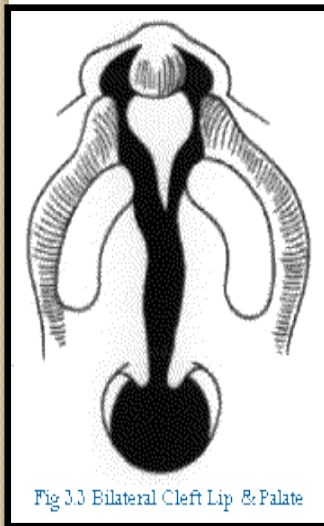
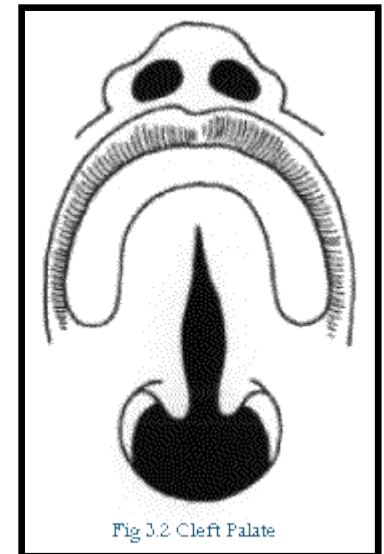


Group I

Clefts of lip only
(2°)

Group II

Clefts of palate only
(2°)

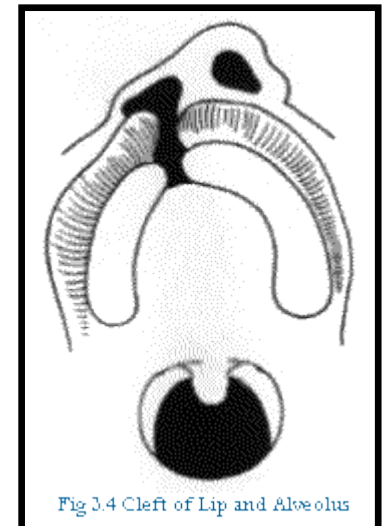


Group III

Clefts of lip,
alveolus,
palate

Group IV

Clefts of lip
and alveolus
(primary cleft
palate and lip)



Group V

Miscellaneous

Embryology

- Primary Palate Forms during 4th to 7th week of Gestation
Defect anterior to incisive foramen
 - ▢ **prepalatal alveol, maxilla, lip, nose and palatine bone**
- Unilateral or bilateral
- Cleft severity varies
 - ▢ **Complect (all skin, muscle, mucosa, maksillary and nasal bones, nasal cartilages)**
 - ▢ **Incomplect (intact nasal sill, minimally seperated, only small scar)**

■ ■ ■

- Secondary Palate Forms in 6th to 9th weeks of gestation
 - Palatal shelves change from vertical to horizontal position and fuse
 - Tongue must migrate antero-inferiorly
- Face is formed at intrauterine at 10th week.

Etiology

❑ multifactorial

- Most cases have no known cause.
- Occur when tissues in the baby's face and mouth don't form properly.
- Normally ,the tissues make up the lip and palate fuse together in the 2nd and 3rd months of pregnancy.
- In baby's with cleft lip/palate, fusion never takes place or partially , leaving an opening(cleft).

Genetic Factors (Otozomal Ressesive)

- First child has anomaly
 - ▢ Probability of second child % 4
 - ▢ Probability of third child % 10
- Two children have anomaly
 - ▢ Probability of third child % 20
- Mother or Father has anomaly
 - ▢ Probability of first child % 5
- Both mother and father have anomaly
 - ▢ Probability of first child % 25

Among total number of clefts:

- 20% CL (18% unilateral, 2% bilateral)
- 50% CL and CP (38% unilateral, 12% bilateral)
- 30 % CP alone
- Thus , unilateral CL/P is more common.
- Bilateral one is difficult to manage.



Environmental factors

- Mothers sickness during first trimester (viral infections)
- Chronic diseases (Diabetes Mellitus etc.)
- Drugs (tranquilizer, hipnotics, sedatives, cortizon, Ethanol, Rubella virus, thalidomide, aminopterin. etc)
- Smoking
- Aspirin, X Rays

Problem in CL/CP

- Feeding
- Frequent upper respiratory tract infection
- Frequent gas regurgitation
- Otitis media/hearing problem
- Nasal regurgitation of food
- Aspiration pneumonia
- Growing retardation and dental problem
- Speech and languages problem(delayed)
- Psychological problems (stigma)

Clinical manifestation

- Cleft lip can vary from a small notch in the vermillion border to a complete separation involving:
 - skin, muscle,
 - mucosa, tooth, and bone.
- Clefts may be unilateral (more often on the left side) or bilateral and can involve the alveolar ridge.

C/m...

- The palate can also have a sub-mucosal cleft indicated by a bifid uvula, partial separation of muscle with intact mucosa, or a palpable notch at the posterior of the palate.
- In sub mucosal cleft:-
 - difficulty of swallowing
 - Nasal speaking voice
 - Recurring ear infections.

Prenatal Diagnosis

- Diagnosed until the soft tissues of the fetal face can be clearly visualized sonographically (13 to 14 weeks).
- Physical examination after birth.

Cleft lip and palate treatment team

- Surgeon experienced in cleft management
- Pediatricist
- Orthodontist
- Pediatric Otorhinolaryngologist(ENT)
- Pediatric dentist
- Speech Therapist, Social Worker
- Nurse experienced in cleft problems.

Surgery

- Surgical closure of a cleft lip is usually performed by 3 month of age, when the infant has shown satisfactory:
 - weight gain and
 - is free of any oral respiratory or systemic infection.
- Cleft lips between 3-6 months.
- Cleft palate between 12-18 months (preferred before speech develops).

■ ■ ■

- Most common surgeries are:
 - Repair of the lip
 - Repair of the CP
 - Closure of the palatal fistula.
 - Surgical Techniques
 - Millard
 - Wardill-Kilner.

■ ■ ■

- The goals of surgery are:-
 - the union of the cleft segments
 - intelligible and pleasant speech
 - reduction of nasal regurgitation, and
 - avoidance of injury to the growing maxilla.
- ❖ When to operate?
- Rules of 10's- weight > 10lb, Hct > 10mg/dl and age > 10wks.

■ ■ ■

- Nasal surgery can also be performed at the time of the lip repair.
- Cosmetic results depend on:-
 - the extent of the original deformity
 - healing potential of the individual patient
 - absence of infection and malnutrition
 - the skill of the surgeon.

■ ■ ■

- the timing of surgical correction should be individualized.
- Criteria such as:
 - width of the cleft, adequacy of the existing palatal segments.
 - morphology of the surrounding areas (width of the oropharynx), and
 - neuromuscular function of the soft palate and pharyngeal walls affect the decision.

...

- A cleft palate usually crosses the alveolar ridge and interferes with the formation of teeth in the maxillary anterior region.
- Teeth in the cleft area may be displaced, malformed, or missing.
- Missing teeth or teeth that are nonfunctional are replaced by prosthetic devices.

Complication

- Acute Period
 - ❖ bleeding,
 - ❖ Airway obstruction, Infection
 - ❖ Wound separation
- Late
 - ❖ maxillary hypoplasia,
 - ❖ dental problems
 - ❖ Hearing problems, velopharyngeal insufficiency
 - ❖ Fistula formation.

Postoperative Nursing Management

- Cleanse the cleft areas by giving 5–15 mL of water after each feeding.
- Assess oral cavity every 2 hours or as needed for tenderness, reddened areas, lesions, or presence of secretions.
- Assess respiratory status and monitor vital signs at least every 2 hours.
- Gentle aspiration of the nasopharynx minimizes the chances of the common complications of atelectasis or pneumonia. .

Post op...

- Position the infant with cleft lip repair on side or back only.
- Use soft elbow restraints and remove every 2 hours and replace.
- A fluid or semifluid diet is maintained for 3 wk.
- Provide developmentally appropriate activities (e.g., mobiles, music)..

Post op.....

- Minimize risk of aspiration(positioning after feeding).
- Family support to see whole child, rather than focusing on cleft.
- Support feeding
- Demonstrate feeding techniques and alternatives
- Prevent infection and complications.

Feeding

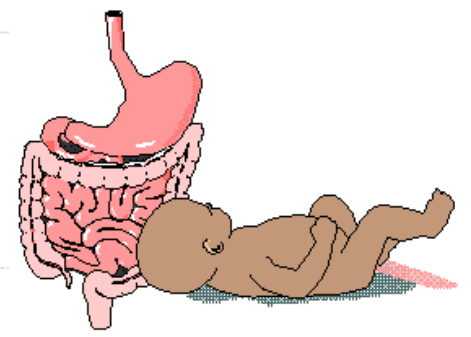
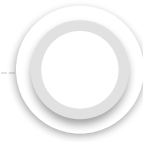
- Infants with CL/P have feeding problems.
- If the cleft involves the hard palate, the infant is usually not able to suck efficiently.
 - Experiment (special nipples or alternate feeding positions)
- The infant should be held in a nearly sitting position during feeding
 - Prevents flowing to the back into the nose.
- Should be burped frequently, (q 3-4min).

Feeding rules

- If swallowing is not impaired, oral feeding is possible
- Bottle feed with additional cross cut in the end
- Elastic plastic bottle
- Bulb syringe with a nipple
- The child should be held in a head-up position at about 45 ° during and after feeding.
- Lateral position during sleeping
- Feed small amounts slowly and frequently.

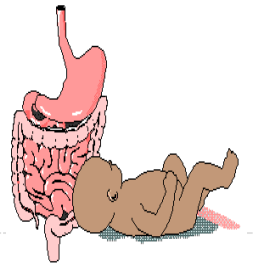
Prognosis

- Most of CL/P health without complication after treatment.
- Depends on severity of defect.
- Another surgery may be needed.
- Hearing test is necessary
- Speech problem may occur.



Diarrhoea

Diarrhoea



- **Definition:**

An increase in the fluidity, volume and frequency of stools.

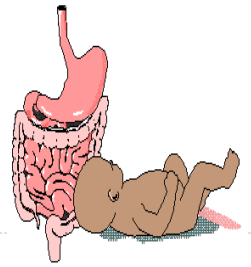
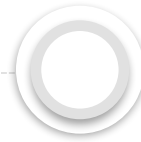
- **Acute diarrhea:**

Short in duration (less than 2 weeks).

- **Chronic diarrhea:**

4 weeks or more

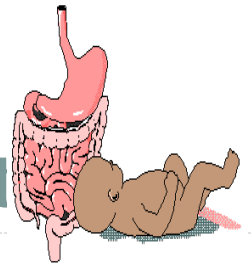
Diarrhoea



Annual incidence of Diarrhoeal episodes in children ≤ 5 year old in developing countries
3.2 episodes per child ,
2 billion episodes globally

Annual mortality from diarrhoea in children ≤ 5 Years in developing countries
1.8 million deaths
Decreased from 4.5 million deaths
in last 20 years

Etiology of Diarrhea(infant)



Acute Diarrhea

Gastroenteritis

Systemic infection

Antibiotic association

Overfeeding

Chronic Diarrhea

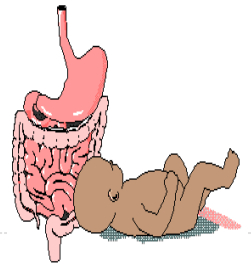
Post infections

Secondary disaccharidase
deficiency

Irritable colon syndrome

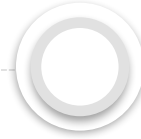
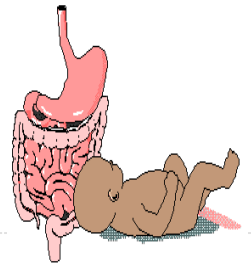
Milk protein intolerance

Types of Diarrhoea



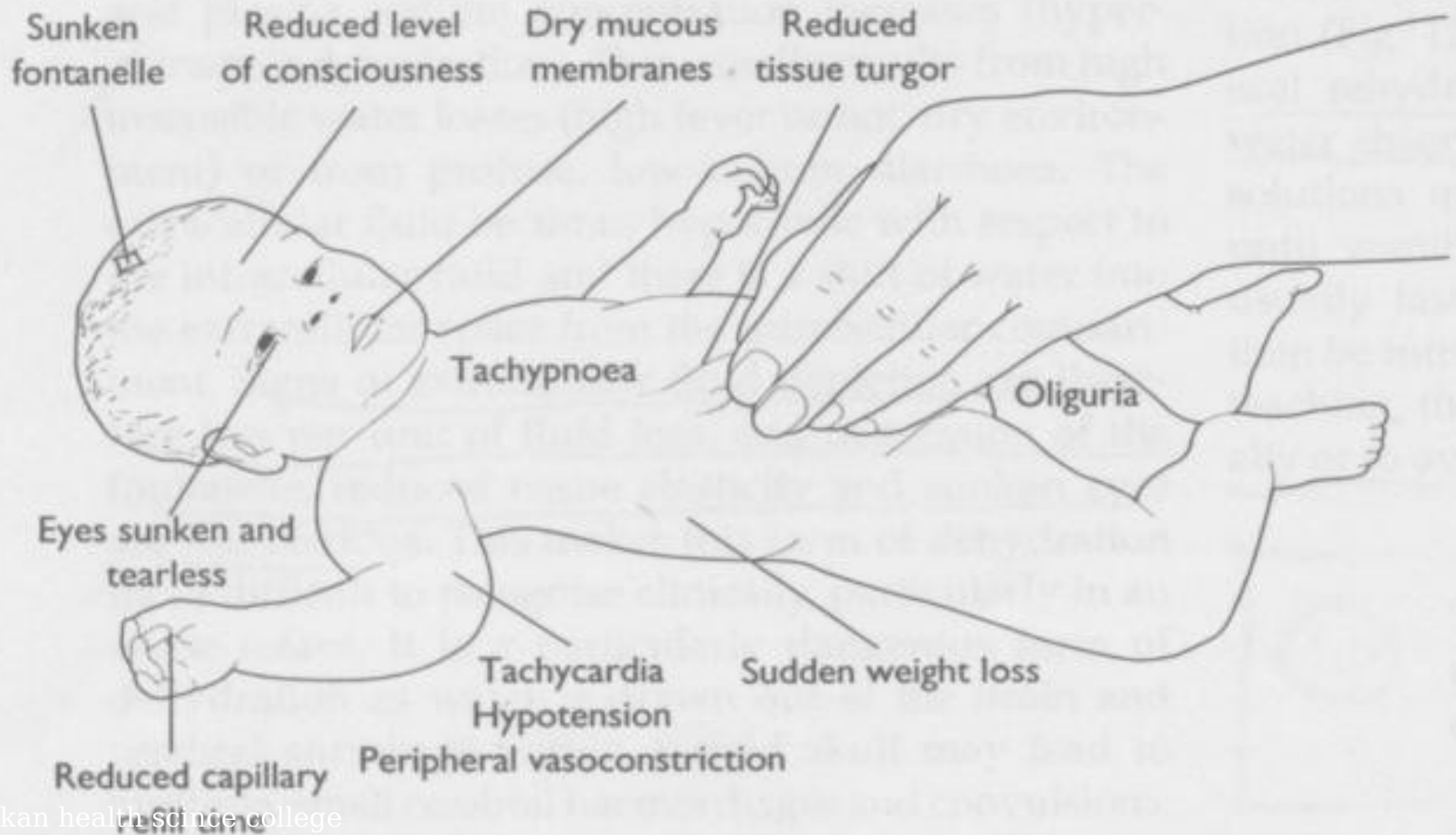
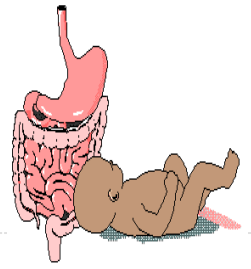
- **Acute watery diarrhea: (80% of cases)**
 - Dehydration
 - Malnutrition
- **Dysentery: (10% of cases)**
 - Anorexia/weight loss
 - Damage to the mucosa
- **Persistent diarrhea: (10% of cases)**
 - Dehydration
 - Malnutrition

Mechanism of Diarrhoea



- Osmotic
- Secretory
- Exudative
- Motility disorders

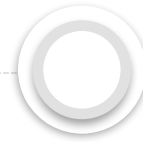
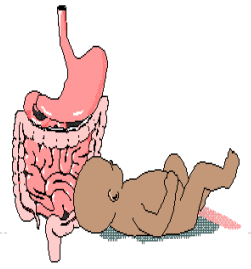
Assessment of Dehydration



Degree of Dehydration

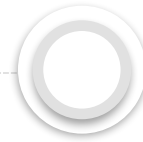
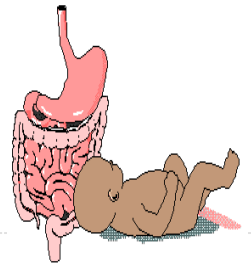
<u>Factors</u>	Mild < 5%	Moderate 5-10%	Severe >10%
<i>General Condition</i>	Well, alert	Restless, thirsty, irritable	Drowsy, cold extremities, lethargic
<i>Eyes</i>	Normal	Sunken	Very sunken, dry
<i>Anterior fontanelle</i>	Normal	depressed	Very depressed
<i>Tears</i>	Present	Absent	Absent
<i>Mouth + tongue</i>	Moist	Sticky	Dry
<i>Skin turgor</i>	Slightly decrease	Decreased	Very decreased
<i>Pulse (N=110-120 beat/min)</i>	Slightly increase	Rapid, weak	Rapid, sometime impalpable
<i>BP (N=90/60 mm Hg)</i>	Normal	Deceased	Deceased, may be unrecordable
<i>Respiratory</i>	Slightly	Increased	Deep, rapid

Complications of diarrhoea



- Dehydration
- Metabolic Acidosis
- Gastrointestinal complications
- Nutritional complications

Treatment of Diarrhoea



- Plenty of fluids
oral rehydration solution using ingredients found in household can be given.
Ideally these drinks should contain:
 - . starches and/or sugars as a source of glucose and energy,
 - . some sodium and
 - . preferably some potassium.

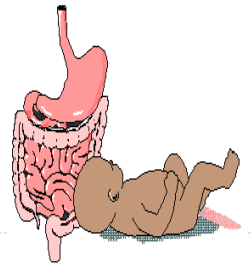
Breastmilk

Gruels (diluted mixtures of cooked cereals and water)

Carrot Soup

Rice water - congee

Treatment of Diarrhoea



- **Home made ORS recipe**

Preparing a 1 (one) litre oral rehydration solution [ORS] using Salt, Sugar and Water at Home

Mix an oral rehydration solution using one of the following recipes; depending on **ingredients and container availability**:

Ingredients:

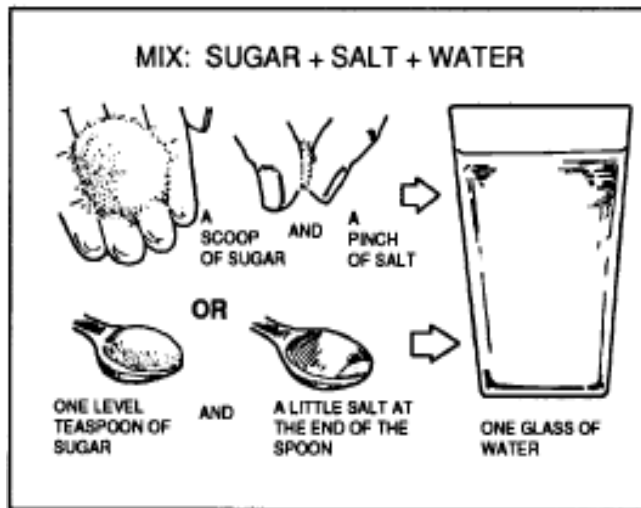
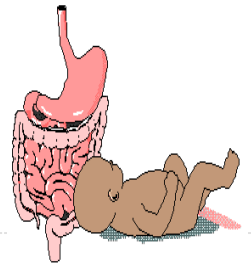
- **one level teaspoon of salt**
- **eight level teaspoons of sugar**
- **one litre of clean drinking or boiled water and then cooled**

5 cupfuls (each cup about 200 ml.)

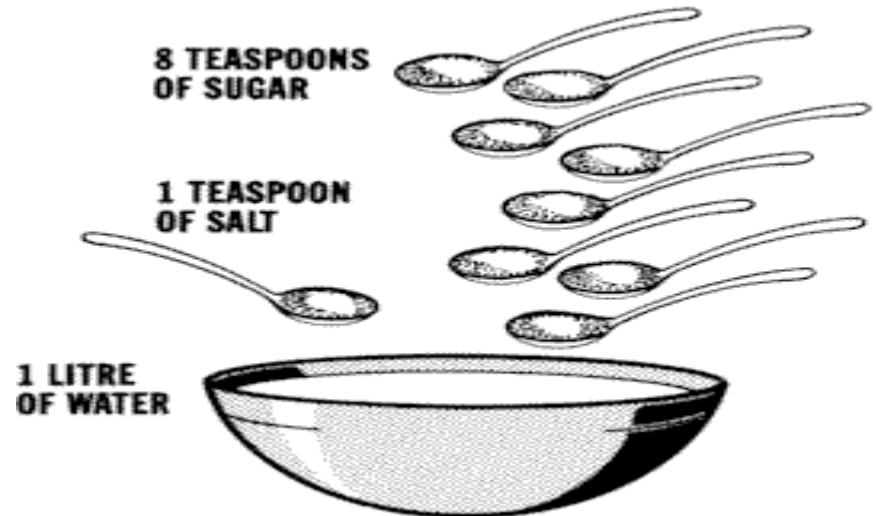
- **Preparation Method:**

- Stir the mixture till the salt and sugar dissolve.

Preparation of ORS



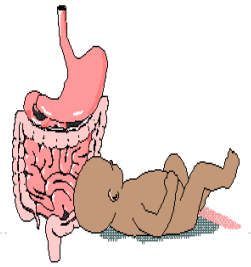
Preparation of glassful of ORS



Preparation of 1 Litre ORS

Taste the drink before giving! It should be no more salty than tears.

ORS

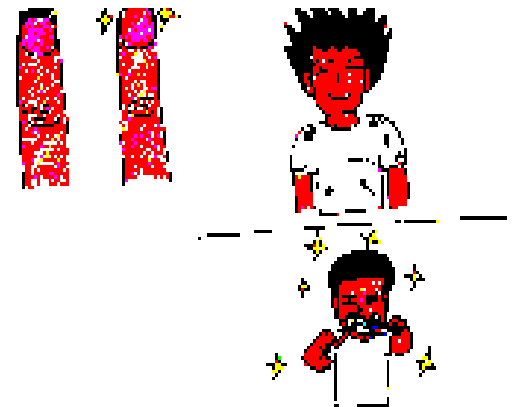


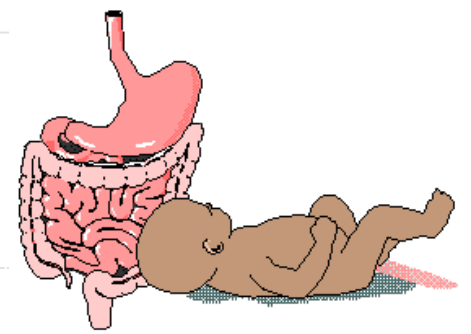
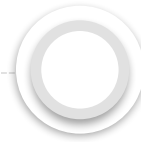
The formula for ORS recommended by WHO/ UNICEF contains

Reduced osmolarity ORS	Grams / litre	Reduced Osmolarity ORS	mmols/litre
Sodium chloride	2.6	Sodium	75
Glucose, anhydrous	13.5	Chloride	65
Potassium chloride	1.5	Glucose, anhydrous	75
Trisodium citrate, dihydrate	1.9	Potassium	20
		Citrate	10

Prevention

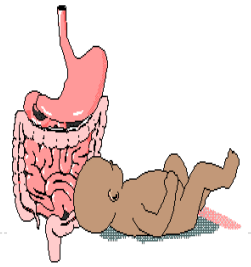
- Wash your hands frequently, especially after using the toilet, changing diapers.
- Wash your hands before and after preparing food.
- Wash diarrhea-soiled clothing in detergent and chlorine bleach.
- Never drink unpasteurized milk or untreated water.
- Drink only boiled/filtered water.
- Proper hygiene.





Vomiting

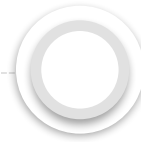
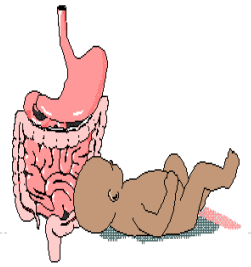
Vomiting in children



- **Definition:**

The forceful expulsion of contents of the stomach and often, the proximal small intestine.

Causes of vomiting



- Neonate/ Infant

- **With fever**

- Sepsis, meningitis, UTI
 - Tonsillitis, otitis media, gastroenteritis

- **If no signs sepsis**

- Pyloric stenosis/ outlet obstruction
 - Metabolic
 - Neurologic
 - Endocrine

- Child/ adolescents

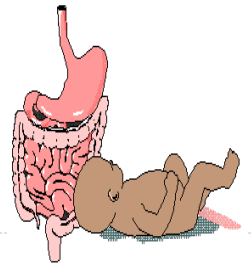
- **With fever (but otherwise well)**

- Gastroenteritis, esp if also have diarrhoea

- **With lethargy/ altered mental status**

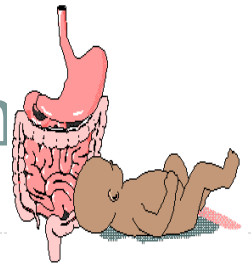
- Neurologic
 - Metabolic
 - Endocrine
 - Drugs, toxins, alcohol

Physiology of vomiting



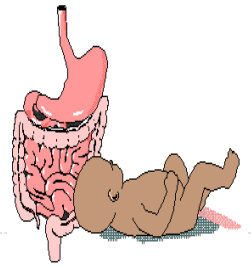
- ✓ Nausea - Feeling of aversion for food and an imminent desire to vomit.
- ✓ Retching - Spasmodic respiratory movements conducted with a closed glottis.
- ✓ Emesis or vomition - Deep inspiration, the glottis is closed and the is raised to open the UES
 - The diaphragm contracts to increase negative intrathoracic pressure.
 - Abdominal muscles contract.

Investigations for Acute Vomiting

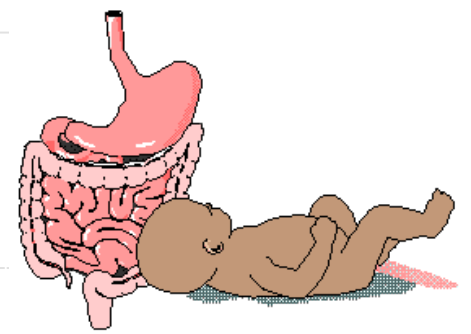
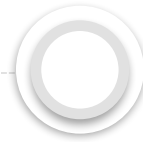


- Thorough examination
- “Septic workup” – blood cultures, urine, FBC, CRP, LP
- Upper GI radiology – Barium swallow/ meal, AXR, ultrasound abdomen, endoscopy
- Metabolic investigations – blood gas, ammonia, blood and urine organic acids

Management

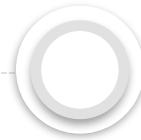
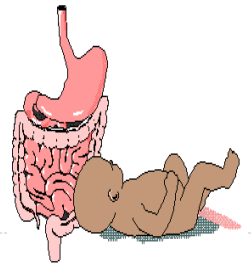


- Depends on specific cause
- While investigating/ treating underlying pathology – replace lost fluids, maintain hydration
- If mild and child able to drink, can try oral rehydration. Intravenous may also be required
- Pharmacologic agents *not* usually recommended
 - May mask signs of serious disease
 - Undesirable side-effects in children



Constipation

Constipation in Children

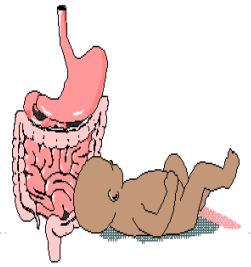


- Defined as a delay or difficulty in defecation, present for two or more weeks and sufficient to cause significant distress to the patient.

NASPGAN 2006

- Stool frequency of < 3 per week is also defined as constipation
- **Prevalence:** 3% of visits to Pediatricians
- 25% of Pediatric Gastroenterology consultations(Molnar D, Arch Dis Child 1983)

Etiology of Constipation



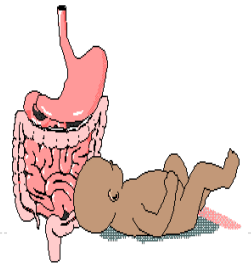
● Congenital

1. Anorectal defects
2. Neurogenic
3. Colonic neuropathies
4. Colonic defects

● Acquired

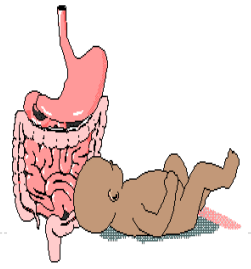
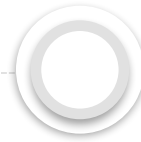
1. Functional
2. Anal lesions
3. Neurologic conditions
4. Metabolic
5. Endocrine
6. Drug induced
7. Low fiber diet
8. Psychiatric problems

Drugs causing constipation



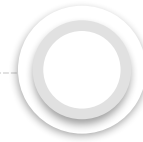
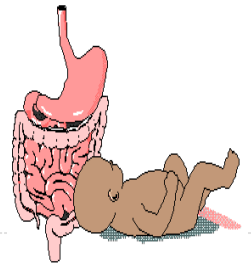
- Antimotility drugs
- Anticholinergics
- Antidepressants
- Opiates
- Antacids
- Phenothiazines
- Methylphenidate

History



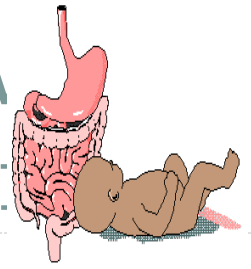
- Constipation history: Frequency, consistency of stools, pain/ bleeding with passing stools, age of onset, fecal soiling, withholding behaviour, nausea/ vomiting, weight loss.
- Family H/o:
- Other important points; Time of passage of meconium, allergies, surgeries, sensitivity to cold, dry skin, Medications.

Physical Findings

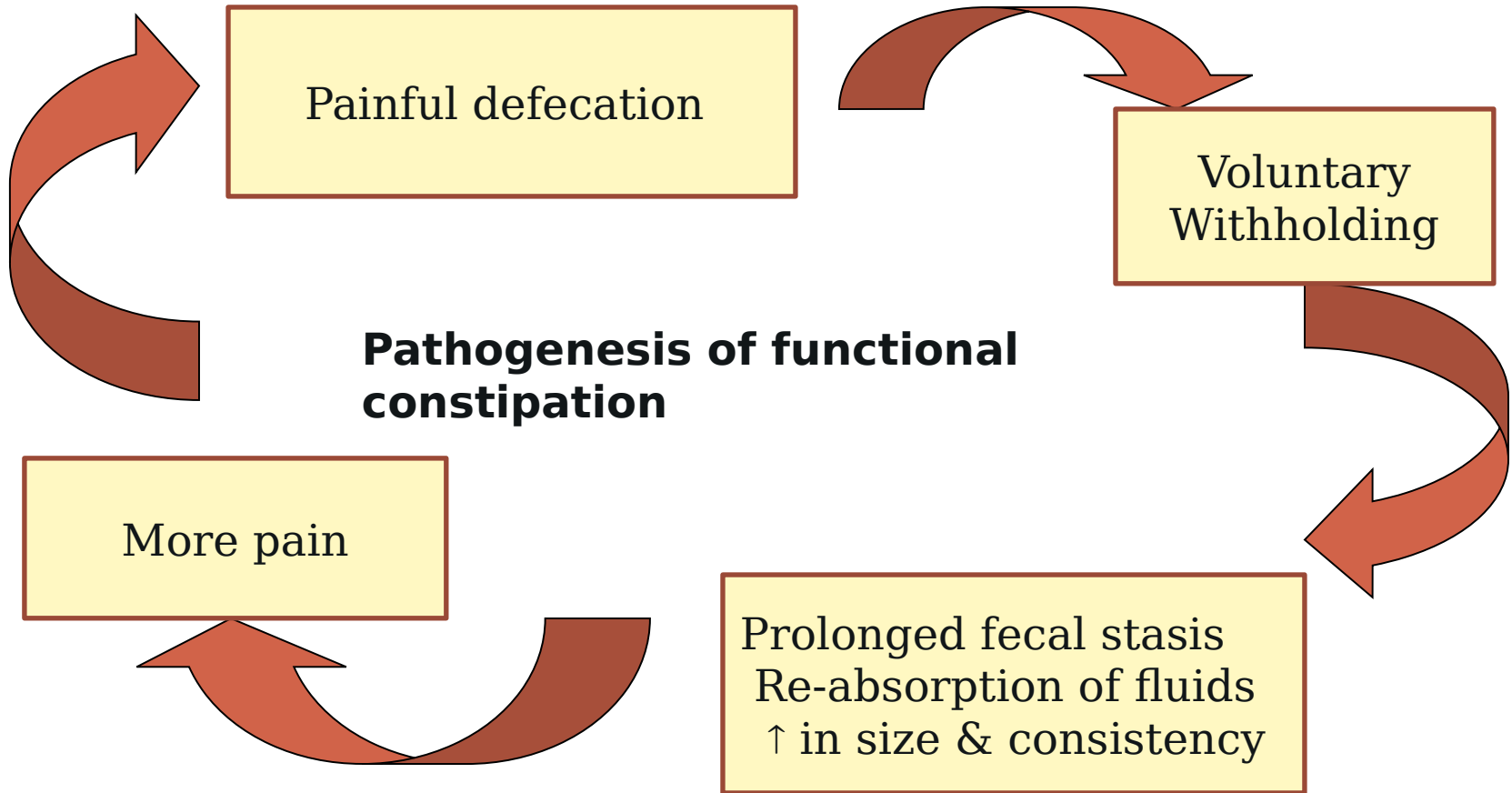
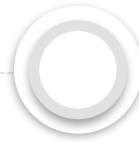


- GPE:
- Abdomen: Distension, fecal mass
- Anal Inspection: Position, stool present around anus or on clothes, anal fissures.
- Rectal Examination: Anal tone, Fecal mass, presence of stool, consistency of stool, other masses, Explosive stool on withdrawal of finger
- Back and Spine:
- Neurological Examination.

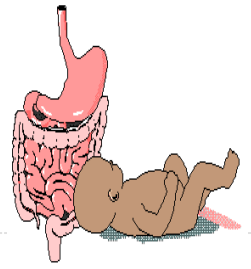
Physical findings to distinguish between functional and organic constipation:



- Failure to thrive
- Abdominal distension
- Lack of lumbosacral curve, pilonidal dimple
- Sacral agenesis
- Anteriorly displaced anus
- Gush of liquid stool and air from rectum on withdrawal of finger
- Decreased lower extremity tone and strength.

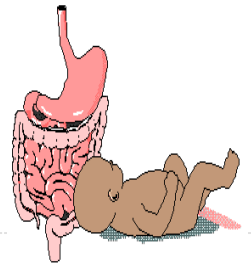


Treatment



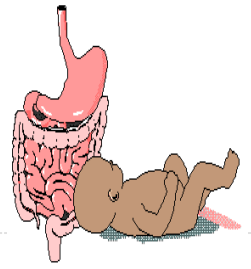
- **Precise, well-organized plan: to clear fecal retention, prevent future retention & promote regular bowel habits.**
- 1. Disimpaction: enema or lavage solutions
- 2. Maintenance: prevention of re-accumulation
- I. Diet
- II. Toilet training
- III. Laxative

Management in Children



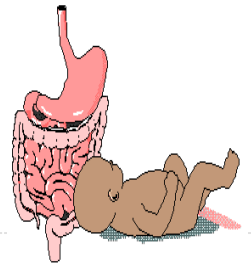
- **Disimpaction:** Either by oral or rectal medication, including enemas
- **Maintenance:**
- **Diet:** a balanced diet, containing whole grains, fruits, vegetables
- **Laxative:** lactulose, sorbitol, magnesium hydroxide, mineral oil are safe & effective
- **Behavioral therapy:** toilet training (5-10min after meal)
- **Rescue therapy:** short course of stimulant laxative
- **Intractable constipation:** Bio-feedback therapy (after 6mo to 1 yr. of intensive medical therapy)

Disimpaction



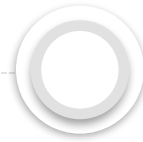
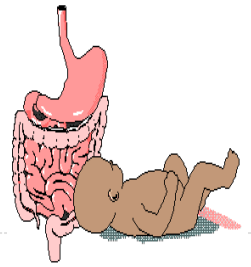
- Fecal impaction: a hard mass in the lower abdomen on physical exam.(seen in 50%),P/R, AXR
- Necessary step before initiating maintenance therapy.
- **Oral route:** non-invasive,gives a sense of power to the child but compliance is a problem.
- **Rectal approach:** faster but invasive (likely to add fear & discomfort that the child already has,may intensify stool withholding)
- **Choice:** should be discussed with parents & child

Maintenance



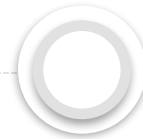
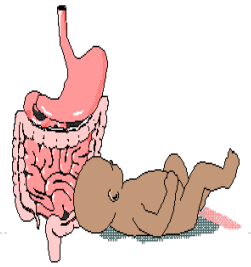
- After removing impaction: prevention of recurrence
- **Dietary intervention:** increased intake of fluids & absorbable and non-absorbable carbohydrate.
- **Behavioral modification:**
 - Toilet training (unhurried time in the toilet for 5-10 min after each meal) for initial months (2-3 yrs of age)
 - Keep diary of stool frequency, consistency, pain, soiling, laxative dose
 - Reward system (positive re-inforcement)

Maintenance



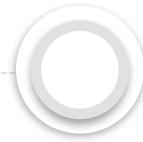
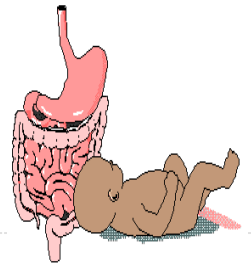
- **Osmotic laxatives**
- Lactulose/sorbitol/magnesium hydroxide:
 - 1-3 ml/kg/day, 1-2 dose/s (increment: 5ml every 3 d)
- **Osmotic enema:**
- Phosphate enema: <2 yrs to be avoided
- >2 yrs: 6ml/kg (upto 135ml)
- **Lavage:**
- PEG solution: disimpaction: 25ml/kg/hr by NG tube until clear output or 20ml/kg/hr for 4 hr/day
- Maintenance: 5-10 ml/kg/day (non-electrolyte PEG)

Maintenance

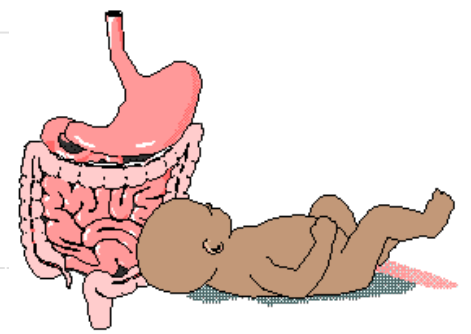
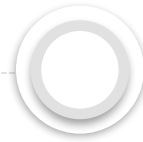


- **PEG without electrolytes as maintenance therapy**
- PEG as lavage solution: due to large volumes, no absorption or secretion of electrolytes.
- PEG in low volume: near complete absorption of electrolytes.
- Advantages of PEG over other laxatives:
- Inert substance, no enzymatic or bacterial degradation
- No flatulence and no loss of activity
- Tasteless or odorless, colorless, mix well in fluid

Maintenance

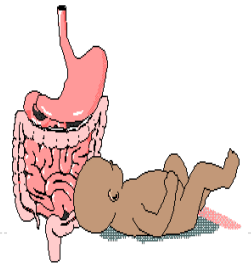
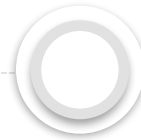


- **Lubricant:**
- Mineral oil: <1 yr: not recommended
- Disimpaction: 15-30 ml/yr of age (240ml daily)
- Maintenance: 1-3 ml/kg/day
- **Stimulants:**
- Senna:
 - 2-6 yrs: 2.5-7.5 ml/day (8.8mg/5ml of Sennosides)
 - 6-12 yrs: 5-15 ml/day
- Bisacodyl:
 - >2 yrs: 0.5-1 suppository (10mg)
 - 1-3 tabs/dose (5mg)



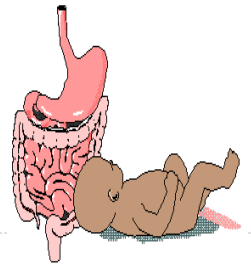
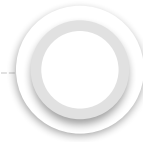
Pica

Pica

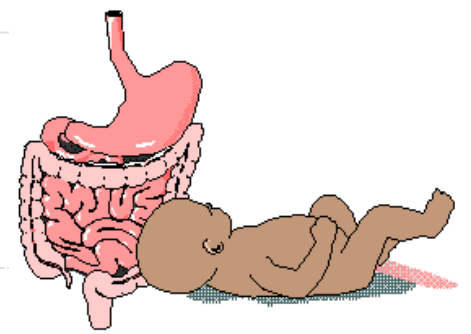
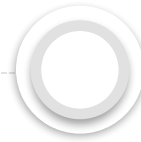


- **Definition** - Persistent ingestion of nonnutritive, unedible substances for a period of at least 1 month at an age at which this behavior is developmentally inappropriate.
- Common in children between 18 mths – 2 Yrs , after 2nd year needs investigation
- Children usually slow in motor and mental development

Pica

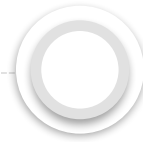
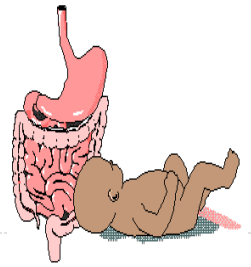


- Mental retardation, lack of parental nurturing predisposing factors
- Increased risk of Lead poisoning, Iron Deficiency anemia, parasitic infection.
- Screening lead poisoning, parasitic infection required



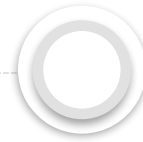
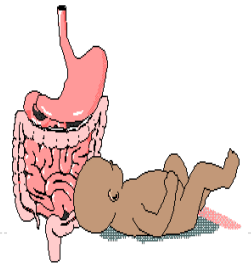
Abdominal Pain

Abdominal pain in Children



- **Acute abdomen:** Severe acute onset of pain which results in urgent need for diagnosis and treatment. May indicate a medical or surgical emergency
- **Less acute pain :** common symptom, may be difficult to elicit and interpret objectively

Approach to Abdominal Pain



- Detailed history

Relationship to feeding, vomiting and diarrhoea, fever, micturition

Onset, duration, aggravating and relieving factors, prior treatment

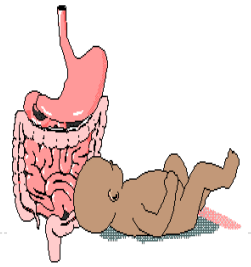
- Decide on the type of pain

Visceral pain: dull, aching, midline, not necessarily over site of disease

Somatic : localized, sharp, from parietal pleura, abdominal wall, retroperitoneal muscles

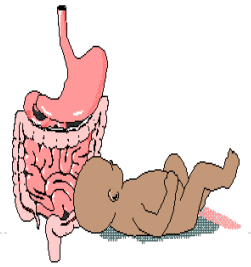
Referred pain : from parietal pleura to abdominal

Visceral Pain



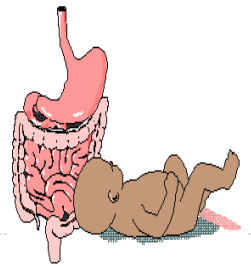
- Typically felt in the midline according to level of dermatome innervation
 - Epigastric
 - Peri-umbilical
 - Suprapubic
- Small intestinal pain felt peri-umbilical and mid-epigastric
- Colon felt over the site because of short mesentery
- Visceral pain becomes somatic if the affected viscus involves a somatic organ eg peritoneum or abdominal wall

Approach to Abdominal Pain



- Restlessness versus immobility
Colic (visceral) vs peritonitis (somatic)
- Assess degree of pain
Even babies feel pain
Assessment has 3 components
what the child says (self report),
how the child behaves
(behavioural)
how the child is reacting
(physiological)
“Faces Pain Scale” used from age 4
onwards

Faces Pain Scale



Faces Pain Scale – Revised (FPS-R)

In the following instructions, say "hurt" or "pain," whichever seems right for a particular child.

"These faces show how much something can hurt. This face [point to left-most face] shows no pain. The faces show more and more pain [point to each from left to right] up to this one [point to right-most face] – it shows very much pain. Point to the face that shows how much you hurt [right now]."

Score the chosen face 0, 2, 4, 6, 8, or 10, counting left to right, so '0' = 'no pain' and '10' = 'very much pain.'

Do not use words like 'happy' and 'sad'. This scale is intended to measure how children feel inside, not how their face looks.

Hicks CL, von Baeyer CL, Spafford P, van Kortlaar I, Goodenough B. The Faces Pain Scale – Revised: Toward a common metric in pediatric pain measurement. *Pain* 2001;93:173-183.
Scale adapted from: Bleit D, Reeve R, Champion GD, Addicoat L, Ziegler J. The Faces Pain Scale for the self-assessment of the severity of pain experienced by children: Development, initial validation and preliminary investigation for ratio scale properties. *Pain* 1990;41:139-150.

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Version: 24 Sep 2001

0

2

4

Fold here

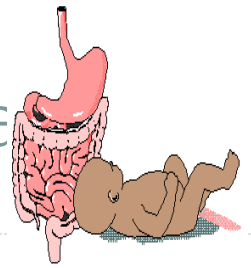
6

8

10

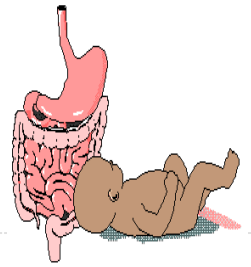


Some Medical Disorders with Abdominal Pain



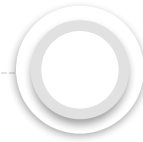
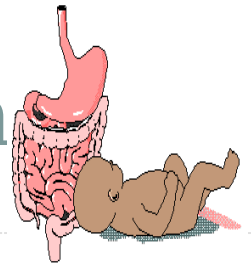
- Mesenteric adenitis : associated with ARI
- Enterocolitis and food poisoning : often diffuse pain before diarrhoea
- Pneumonia: referred from pleura, associated respiratory symptoms and signs
- Inflammatory bowel disorders
- Biliary tract, liver disease and congestion
- Dyspepsia : ulcer and non-ulcer
- Systemic diseases, DKA, Sickle cell disease
- Peritonitis

Recurrent Abdominal Pain



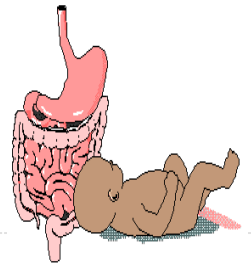
- Very common 10 – 15% of children
- Duration longer than 3 months, affecting normal activity
- Organic cause found in <10% of these
- RAP is defined by four basic criteria:
 - ▯ **History of at least 3 episodes of pain**
 - ▯ **Pain sufficient to affect activity**
 - ▯ **Episodes over a period of 3 months**
 - ▯ **No known organic cause**
- Family history often positive for GI complaints.
- Growth and development normal

Causes of Recurrent Abdominal Pa



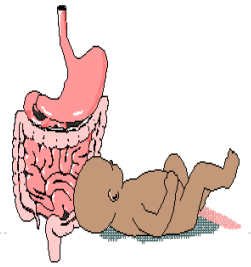
- Common:
 - Parasites
 - Faecal loading
 - Functional abdominal pain
- Less common:
 - Infections
 - Inflammatory disorders
 - Renal cause

Functional Abdominal Pain



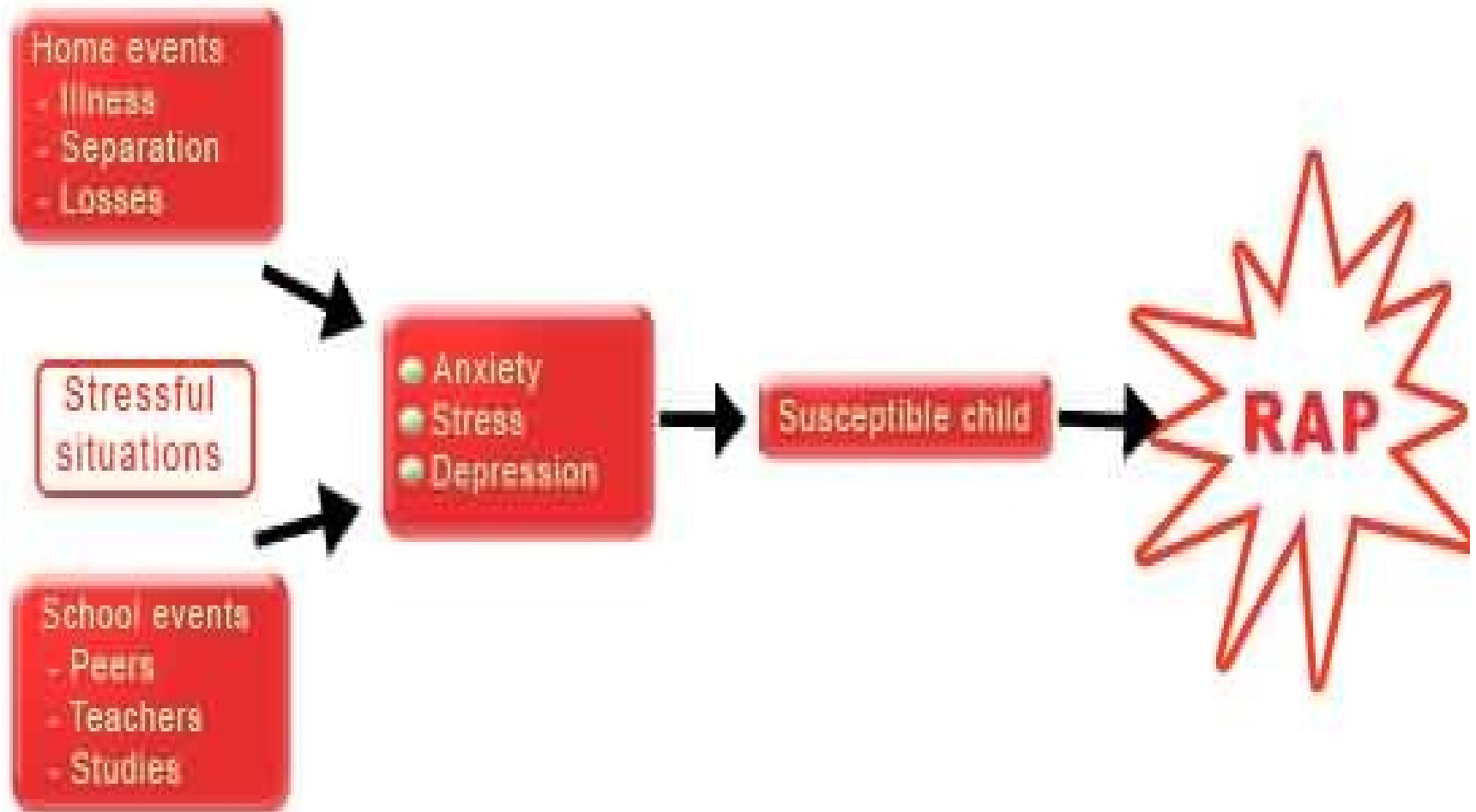
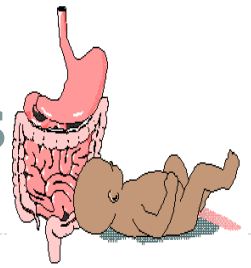
- Typically 5 - 14 years old
- Unrelated to meals or activity
- Clustering of pain episodes: several times per day to once a week, recurring at days to weeks intervals
- Physical or psychological stressful stimuli
- Personality type obsessive, compulsive, achiever
- Family history of functional disorders : reinforcement of pain behaviour

Functional Abdominal Pain

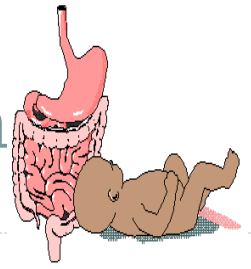


- Vague, constant, peri-umbilical or epigastric pain more often than colic
- Duration <3 hours in 90%, variable intensity
- Associated symptoms: headache, pallor, dizziness, low-grade fever, fatiguability
- May delay sleep, but does not wake the child
- Well-grown and healthy
- Normal FBC, ESR, Urinalysis, Stool microscopy for blood, ova, parasites

Functional Abdominal Pain - Pathogenesis

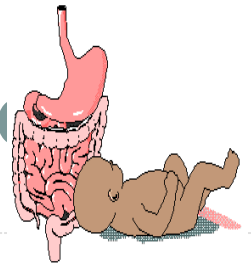


Management of Functional Abdominal Pa



- Positive clinical diagnosis: careful history
- Do not over-investigate: more anxiety
- FBC, ESR, Urinalysis and culture, Stool for occult blood, ova and parasites
- Positive reassurance that no organic pathology is present
- Little place for drugs
- Dietary modification
- Reassuring follow-up

Pointers to Organic Pain in Children



- Age of onset <5 or >14 years
- Localized pain away from umbilicus
- Nocturnal pain waking the patient
- Aggravated or relieved by meals (dyspepsia)
- Loss of appetite and weight
- Alteration in bowel habit
- Associated findings: fever, rash, joint pain
- Abdominal distension, mass, visceromegaly
- Occult blood in stools, anaemia, high ESR

INTUSSUSCEPTIO N

Objective

At the end of this session learners are expected to

- ✓ Define Intussusception
- ✓ Identify causes of Intussusception
- ✓ Explain pathophysiology of Intussusception

- ✓ Describe the different types of

Introduction

- Intussusception occurs when a portion of the alimentary tract is telescoped into an adjacent segment.
- It is the most common cause of intestinal obstruction between 3 mo and 6 yr of age.
- 60% of patients are younger than 1 yr, and 80% of the cases occur before 24 mo;
- it is rare in neonates. The incidence varies from 1 to 4/1,000 live births.
- The male: female ratio is 4:1.
- A few intussusceptions reduce spontaneously, but if left untreated, most will lead to intestinal infarction, perforation, peritonitis, and death.

Ethiopian context..

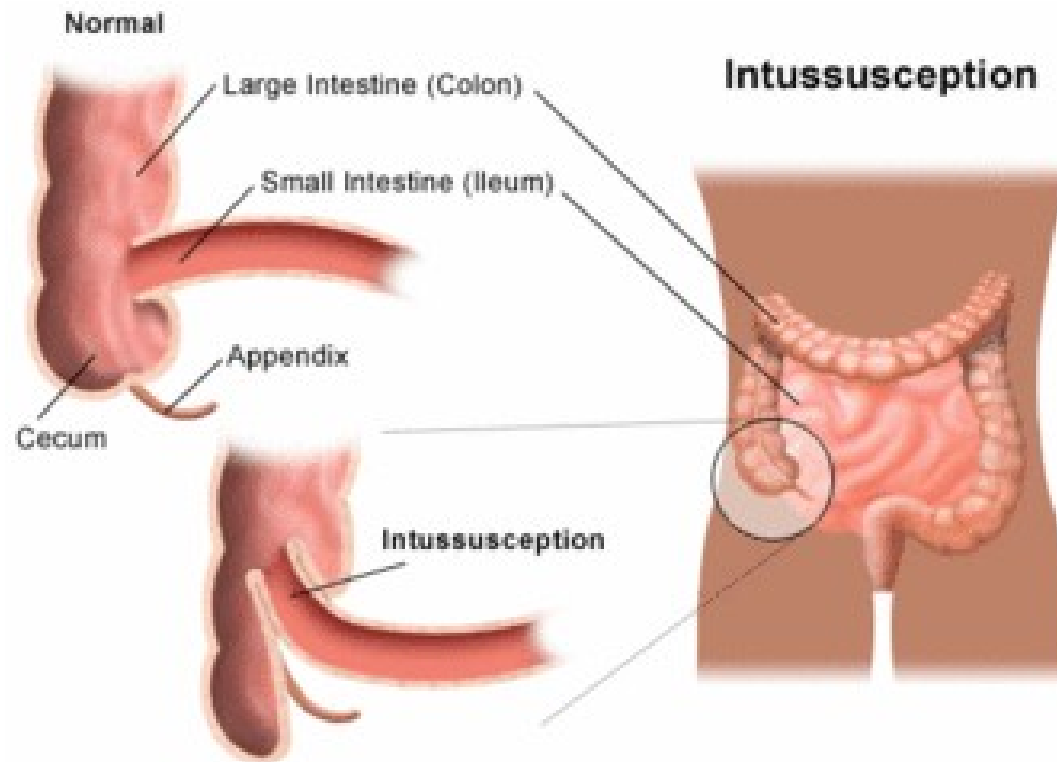
- In Addis Ababa, Ethiopia, the incidence ranged between four and ten cases per year during the period 1977-1986 (Gudeta, 1993).
- It has been suggested that epidemics and environmental factors influencing dietary intake or food contamination may underlay these marked differences.

- In developing countries, delayed diagnosis with ensuing bowel necrosis, followed by attempted operative reduction, is associated with high case fatality rates (e.g., 18% in Nigeria, 20% in Indonesia, and up to 54% in Ethiopia .

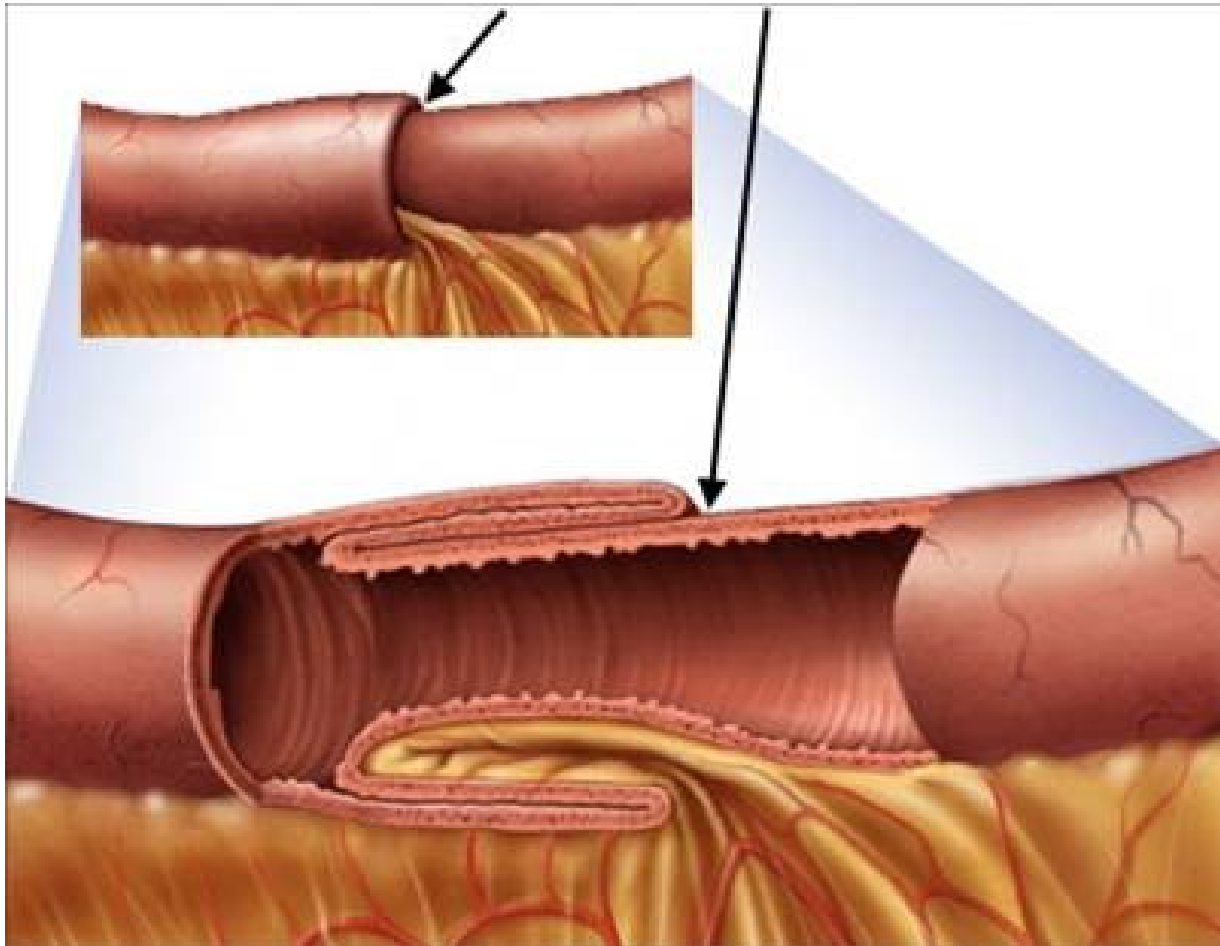
Intussusception

- It is invagination or telescoping of one portion of the intestine into another
- The most common site is the ileocecal valve, in which the ileum invaginates into the cecum and further into the colon.

Just as a refresher...



INTUSSUSCEPTION



PART OF THE INTESTINE FOLDS ON ITSELF LIKE A TELESCOPE

Causes

- Idiopathic (unknown but following a viral infection);
- Lead point (change in the mucosa from another condition such as cystic fibrosis, or hematoma); or post operative

Pathophysiology

Invagination of the bowel



Obstruction resulting in
compression of the vessels
and venous congestion and
bowel wall edema



Infarction

perforation



If left untreated, **FATAL**

Assessment:

- 1-Paroxysmal abdominal pain; legs drawn up
- 2-Blood in stool, or later “currant jelly” stools containing sloughed mucosa, blood, and mucus
- 3- vomiting
- 4-Increasing absence of stools.
- 5-Abdominal distention, bowel sound diminished, absent or high pitch.
- 6-Sausage like mass palpable in abdomen (Dance’s sign).
- 7-Unusual looking anus; may look like rectal prolapse.
- 8-Dehydration and fever
- 9-Shock like state with rapid pulse, pallor, and marked sweating

Diagnostic Evaluation:

X-ray of abdomen may show absence of gas or mass in right upper quadrant.

Barium enema is done if there is no appearance of peritonitis; shows a concave filling defect (will help reduce the invagination).

Ultrasonogram may be done to locate area of telescoped bowel.

Base your next move on CLINICAL SUSPICION...

If **low** suspicion □ AXR

-if negative, unlikely to be IS

If **medium** suspicion □ AXR □ US

-if US negative, unlikely to be IS

If **high** suspicion, you can skip AXR and proceed directly to US

How is intussusception treated?

Two approaches are used in treating intussusception – non operative reduction and surgery

Non operative reduction

- After the diagnosis is confirmed, intussusception is generally reduced (resolved) by gentle pressure exerted within the intestine, using [barium](#) or air enemas
- If your child is ill with an abdominal infection or has other complications, your physician may choose not to attempt to reduce the intussusception with the enema.
- Both barium and air enemas have a low risk (less than 2%) of complications, which could include tearing the intestine.

Surgery

Indications –

- irreducible by enema
- necrotic intussusception
- age
- long duration of sx
- SBO
- clinical signs/sx of peritonitis or bowel infarction

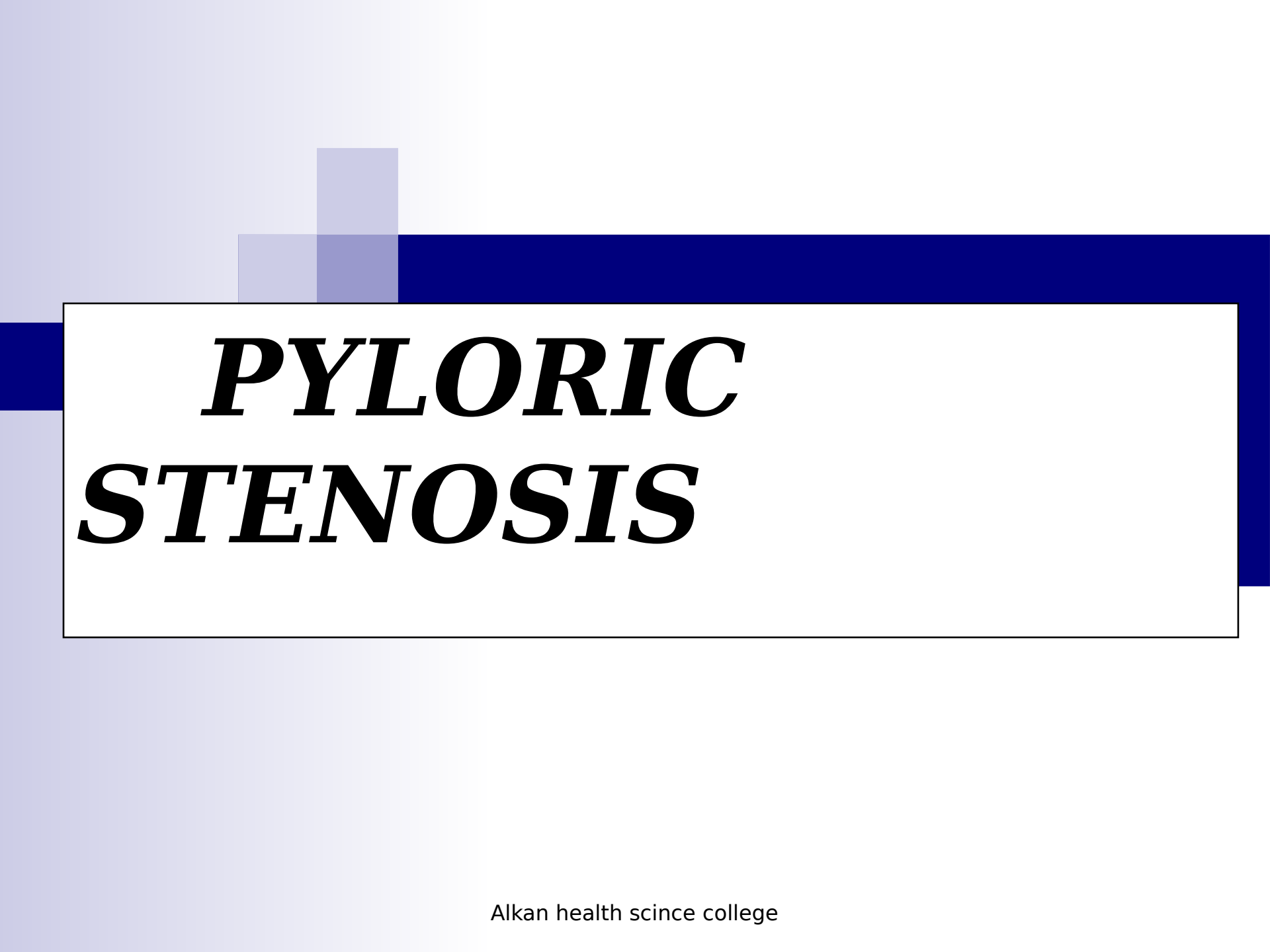
Nursing Intervention:

- Monitor I.V. fluids and intake and output to guide in fluid balance.
- Be alert for respiratory distress due to abdominal distention.
- Monitor vital signs, urine output, pain, distention, and general behavior preoperatively and postoperatively.
- Observe infant's behavior as indicator of pain; may be irritable and very sensitive to handling or lethargic or unresponsive. Handle the infant gently.
- Explain cause of pain to parents, and reassure them about purpose of diagnostic tests and treatments.
- Administer analgesic as prescribed

- Maintain NPO status as ordered.
- Insert nasogastric tube if ordered to decompress stomach.
- Continually reassesses condition because increased pain and bloody stools may indicate perforation.
- After reduction by hydrostatic enema, monitor vital signs and general condition – especially abdominal tenderness, bowel sounds, lethargy, and tolerance to fluids – to watch recurrence.
- Encourage follow up care.

Summary

- It is invagination or telescoping of one portion of the intestine into another
- The cause may be idiopathic (unknown but following a viral infection); lead point (change in the mucosa from another condition such as cystic fibrosis, or hematoma); or post operative
- Two approaches are used in treating intussusception – non operative reduction and surgery



PYLORIC STENOSIS

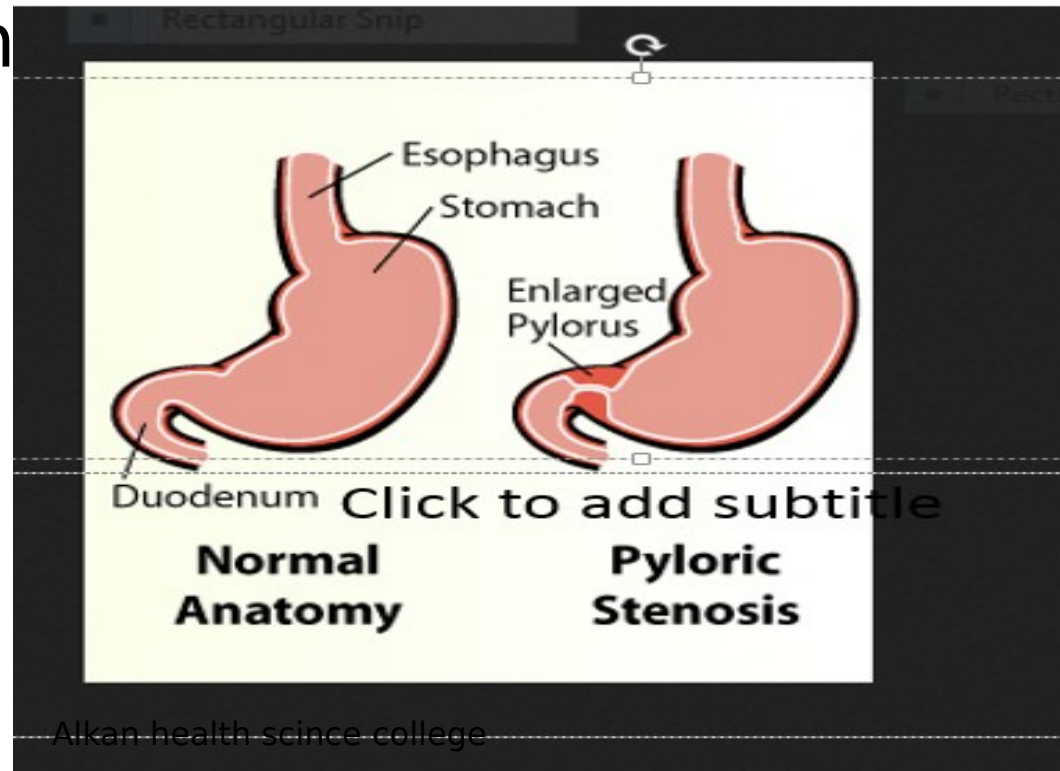


Introduction

- ❖ **pylorus** is a muscle that opens and closes to allow food to pass through the stomach into the intestine
- ❖ Food and drink pass down the oesophagus into the stomach , here they mix with acid and are partially digested.
- ❖ The stomach then normally passes the food and drink into the small intestine through the **pylorus** to be fully digested and absorbed into

Introduction cnt...

- ❖ **Pyloric stenosis** means a narrowed outlet (pylorus) of the stomach
- ❖ Pyloric stenosis, also called **infantile hypertrophic pyloric stenosis**, is a condition caused by an en



Introduction cnt...

- ❖ Presentation is usually early in life, between 3 and 5 weeks of age, and approximately 95% of cases are identified in those aged 3-12 weeks.
- ❖ Pyloric stenosis is usually not present at birth
- ❖ It is unusual in stillbirths and probably develops after birth.
- ❖ It is characterized by hypertrophy of the **two muscle layers of the pylorus(?????)**

Introduction cont...

- ✓ When this muscle becomes enlarged and thickening, feedings are blocked from emptying out of the stomach.
- ✓ The retained feedings cause the infant to vomit.
- ✓ The pyloric canal lengthens, the whole pylorus thickens, and the mucosa becomes oedematous causing functional obstruction of the gastric outlet.

Introduction cont...

- ✓ Infants with IHPS are clinically normal at birth, and subsequently develop nonbilious(??) forceful (“projectile”) vomiting during the first few weeks of postnatal life
- ✓ It is one of the most common causes of intestinal obstruction during infancy that requires surgery.



Introduction cont...

- ✓ A narrowed or blocked outlet from the stomach (pyloric stenosis) can lead to a serious illness unless it is treated
- ✓ it can cause the baby to vomit forcefully and often and may cause other problems such as dehydration and salt and fluid imbalances.
- ✓ The most serious problem is dehydration (excessive water loss from the body).

Introduction cont...

- ✓ A baby who vomits regularly will not get sufficient fluids to meet his / her nutritional needs.
- ✓ Immediate treatment for pyloric stenosis is extremely important.
- ✓ Additionally, minerals that the body needs to stay healthy, such as **potassium** and **sodium**, are lost through vomiting

Introduction cont...

- ✓ Lacking an adequate amount of both water and minerals can cause infants to lose weight and to become extremely sick very quickly.
- ❖ It also leads to emaciation and, if left untreated, may result in death.
- ❖ Greater awareness of pyloric stenosis has led to earlier identification of patients with fewer instances of chronic malnutrition and severe dehydration and at times a subclinical self-resolving hypertrophy

Epidemiology

- ❖ Pyloric stenosis occurs more commonly in Caucasian infants than in babies of other ethnic backgrounds.
- ❖ The incidence of pyloric stenosis is increased in infants with B and O blood groups.
- ❖ Hypertrophic pyloric stenosis occurs in 1-3/1,000 infants in the United States
- ❖ It is more common in whites of northern European ancestry, less common in blacks, and rare in Asians

Epidemiology cont...

- ❖ Incidence varies between regions, but ranges from 2-4 per 1000 live births.
- ❖ The condition is more commonly seen in males(4:1).
- ❖ Mortality is low. An eight-year cohort study of 350 patients admitted to hospital in the Republic of **Ireland** with IHPS identified only one death, which was attributed to an underlying myopathy.

Epidemiology cont...

- ❖ Male and female children of affected fathers carry a risk of 5% and 2% respectively, of developing IHPS.
- ❖ Male and female children of affected mothers carry a risk of 20% and 7%, respectively of developing IHPS.
- ❖ Concordance in monozygotic twins is 0.25-0.44, and that in dizygotic twins is 0.05-0.10.
- ❖ Although not thought to be hereditary, pyloric stenosis occurs more commonly in children of parents who had pyloric stenosis themselves as infants

Ethiopian context

- ❖ **Sixty one** infants with a diagnosis of IHPS were admitted to TAH, Addis Ababa, Ethiopia over a period of 2 years (2011-2012).
- ❖ The clinical records of 55 infants were retrieved and analyzed.
- ❖ The prevalence was 12.9/1000 admissions.
- ❖ The male to female ratio was 6.86:1.
- ❖ The mean age at admission was 44.47days.
- ❖ The mean duration of illness was 26.91 days.

Ethiopian context cont...

- ❖ A palpable mass was found in 14(25.5%) of infants and constipation is reported in 14(25.5%).
- ❖ The treatment was Ramstedt's pyloromyotomy in all cases.
- ❖ There were 6 (10.9%) intra-operative mucosal perforation.
- ❖ **Eight patients** developed postoperative complication 6(10.9%) wound infections, and 2(3.8%) pneumonia.
- ❖ Two patients died.



Etiology

- ❖ The cause of pyloric stenosis is unknown, but many factors have been implicated.
- ❖ It may be a combination of several factors; for example, the use of erythromycin in the first 2 weeks of life has been associated with pyloric stenosis, and there is also a connection in babies whose mothers took this antibiotic at the **end** of pregnancy or during breastfeeding.

Etiology cont...

- ❖ There have also been reports of higher incidence of pyloric stenosis among mostly female infants of mothers treated with **macrolide antibiotics** during pregnancy and breastfeeding.
- ❖ Pyloric stenosis also has been associated with trisomy 18, more concordant in monozygotic than dizygotic twins.

Etiology cont...

- ❖ Abnormal muscle innervation, elevated serum levels of prostaglandins, and infant hypergastrinemia has been implicated
- ❖ Several genetic loci have been implicated, including IHPS1, where a deficient production of neuronal nitric oxide synthase causes **impaired relaxation of pyloric smooth muscle**
- ❖ It has been suggested that a high gastric parietal cell mass may result in impaired gastrin control and hence, duodenal hyperacidity.
- ❖ This hyperacidity may produce IHPS as a result of repeated contraction of the pylorus

Pathophysiology

- ❖ HPS occurs secondary to hypertrophy and hyperplasia of the muscular layers of the pylorus, which cause a functional gastric outlet obstruction.
- ❖ Diffuse hypertrophy and hyperplasia of the smooth muscle of the antrum of the stomach and pylorus proper narrow the channel, which then can become easily obstructed
- ❖ The antral region is elongated and thickened to as much as **twice** its

Pathophysiology cont...

- ❖ In response to outflow obstruction and vigorous peristalsis, stomach musculature becomes uniformly hypertrophied and dilated.
- ❖ Gastritis may occur after prolonged stasis. Hematemesis is occasionally noted.
- ❖ The patient may become dehydrated as a result of vomiting and develop marked hypochloremic alkalosis.

Clinical manifestation

- ✓ It is believed that babies who develop pyloric stenosis are not born with it, but that the progressive thickening of the pylorus occurs after birth.
- ✓ A baby will start to show symptoms when the pylorus is so thickened that the stomach can no longer empty properly
- ✓ Most infants who develop symptoms of pyloric stenosis are usually between 3 to 5 weeks

clinical manifestaion cont...

- ✓ The main symptom of pyloric stenosis is **vomiting undigested** breast milk or formula soon after a feeding.
- ✓ Visible peristaltic waves in the left upper part of the abdomen
- ✓ **Nonbilious** vomiting is the initial symptom of pyloric stenosis ,usually begins at **four weeks** of age but can happen as early as **two weeks after birth**

clinical manifestaion cont...

- ❖ The vomiting may or may not be projectile initially but is usually progressive, occurring immediately after a feeding
- ❖ Emesis might follow each feeding, or it may be intermittent.
- ❖ The vomiting usually starts after 3 wk of age, but symptoms can develop as early as the 1st wk of life and as late as the 5th mo.

clinical manifestaion cont...

- ❖ About 20% have intermittent emesis from birth that then progresses to the classic picture.
- ❖ After vomiting, the infant is hungry and wants to feed again.
- ❖ As vomiting continues, a progressive loss of fluid, hydrogen ion, and chloride leads to hypochloremic metabolic alkalosis.

Clinical manifestation cont...

- ❖ **Hypokalaemia** (as the kidneys compensate for the underlying alkalosis by preferentially excreting potassium in order to retain hydrogen ions).
- ❖ s/s of malnutrition and severe dehydration & poor weight gain may also be apparent.

Clinical manifestation cont...

- ❖ **Hyperbilirubinemia(?????)** is the most common clinical association of pyloric stenosis, also known as *icteropyloric syndrome*.
- ❖ Once vomiting begins it becomes more frequent, and severe, and is often described as "forceful" or "projectile"
- ❖ Infants with pyloric stenosis may become fussy and, since they cannot keep down all their feedings, are hungry between feedings and are not able to gain weight normally.

Clinical manifestation cont...

- ❖ If the vomiting continues infants may become ill from dehydration.
- ❖ **Changes in stools.** Babies with pyloric stenosis usually have fewer, smaller stools because little or no food is reaching the intestines
- ❖ Constipation, Weight loss
- ❖ Lethargy (lack of energy)



complication

- ❖ *Sever dehydration*
- ❖ *Electrolyte and acid -base imbalance*
- ❖ *Unable to thrive*
- ❖ *Malnutrition*
- ❖ *Death (if not managed promptly)*
- ❖ *Aspiration Pneumonia)*

Differential diagnosis

- ❖ Gastric waves are occasionally visible in small, emaciated infants who do not have pyloric stenosis.
- ❖ Infrequently, gastroesophageal reflux, with or without a hiatal hernia, may be confused with pyloric stenosis.
- ❖ Bowel Obstruction in the Newborn, Duodenal Atresia(????)
- ❖ Gastroenteritis, Gastroesophageal Reflux disease, Intestinal Malrotation.

Diagnostic methods

- ❑ History and clinical
- ❑ Diagnosis can be made in 75% of infants with IHPS by careful **physical examination** of the upper part of the abdomen.
- ❖ Careful physical examination generally reveals a firm mass, the size of an olive, in the mid-abdomen can be identified by palpating the pyloric mass.
- ❖ The mass is firm, movable, olive shaped, hard, best palpated from the **left side**, and located above and to the **right of the umbilicus** in the mid-epigastrium beneath the liver's edge.
- ❖ After feeding, there may be a visible gastric peristaltic wave that progresses across the abdomen .

Diagnosis cont...



Alkan health science college
Figure 321-1 Gastric peristaltic wave in an infant with pyloric stenosis.

Diagnosis cont...

- ❑ **Blood tests** – These are done to evaluate dehydration and mineral imbalances.
- ❑ **Abdominal ultrasound** -- This is the **gold standard** for diagnosing pyloric stenosis.
- ❖ b/c Ultrasound examination confirms the diagnosis in the majority of cases.
- ❖ It is used to determine the thickness and length of the pyloric muscle.
- ❖ **Ultrasound is** the diagnostic test of choice, although the accuracy is operator-dependent.

Diagnosis cont...

- ❑ The size of the pylorus is measured and compared to standard values.
- Criteria to diagnose: Pyloric muscle thickness >4mm, pyloric muscle length >14 – 20mm and pyloric diameter >10-14mm is diagnostic in term infants, with both a high sensitivity (90-99%) and high specificity (97-100%).
- Ultrasound is less accurate in premature infants.

Diagnosis cont...

- ❑ **Barium swallow / upper GI series**
 - ✓ Barium studies show classical signs of an elongated pyloric canal ('string sign') or thickened pyloric mucosa ('double-track sign').
 - ✓ A dense, chalky fluid called barium, which is used to coat the inside of organs so they will show up on an X-ray, is swallowed.
 - ✓ X-rays are then taken to evaluate the digestive organs.
 - ✓ This test will also demonstrate a delayed emptying of the stomach content as well as the narrowing of the pylorus.
- ❑ **Endoscopy** :Reserved for patients with atypical clinical signs when ultrasonography and UGI studies are nondiagnostic

Treatment

- ✓ Pyloric stenosis is treated in two stages.
- ✓ First ,ABC, fluids are given intravenously to treat dehydration and restore the body's normal chemistry
- ✓ The preoperative treatment is directed toward correcting the fluid, acid-base, and electrolyte losses.
- ✓ Conservative Management, IHPS can be managed conservatively by naso-duodenal feeding.
- ✓ This has to be continued over several months to allow the obstructive process resolve and the infant to gain weight

Treatment cont...

- ✓ Once this is done, the **surgical procedure of choice** is pyloromyotomy.
- ✓ This is not an emergency procedure, and surgery may proceed only when fluid balance, acid-base status and electrolyte levels have been restored to normal.
- ✓ It can be performed through a short transverse skin incision.
- ✓ The underlying pyloric mass is cut longitudinally to the layer of the submucosa, and the incision is closed.

Treatment cont...

- ✓ This opens up the tight muscle that has caused the narrowing in the stomach, allowing the passage of food from the stomach to the intestine.
- ✓ This surgery can be performed using either an open or laparoscopic surgical approach
- ✓ Laparoscopic technique is equally successful and in one study resulted in a shorter time to full feedings and discharge from the hospital as well as greater parental satisfaction

Treatment cont...

- ✓ The success of laparoscopy depends on the skill of the surgeon
- ✓ **Pain** While in the operating room, your baby will receive a anti-pain medication that is injected into the incision.
- ✓ This should allow him/her to feel and appear comfortable for about six to eight hours after surgery

Treatment cont...

✓ **Feedings**

- ✓ Within **two hours** after surgery, small amounts of milk or liquids are given.
- ✓ Over a 24- to 48-hour period, feedings are gradually increased.
- ✓ As soon as your baby can tolerate normal feedings (usually **one to two days** after surgery), he/she will be discharged from the

Treatment cont...

- ❖ After discharge, it is strongly recommended to do no more than 3 ounces every three hours for the next three days.
- ❖ Conservative management with nasoduodenal feedings is advisable in patients who are not good surgical candidates.
- ❖ Oral and intravenous atropine sulfate (pyloric muscle relaxant) has also been described when surgical treatment is not available.

Nursing management

- ✓ Assess ,identify ,plan and intervene the infant's problem accordingly(NSG process) eg nsg dx???
- ✓ Maintain input and output
- ✓ Fluid and medication administration
- ✓ Proper pre and post operative nursing care
- ✓ sterile wound care
- ✓ Psychological support for family
- ✓ Nasodudodenal feeding if necessary
- ✓ Advice the mother feeding technique

prognosis

- ✓ Prognosis depend on the successfulness and skill of the surgen,the absence of other medical problems as well as the time of diagnosis and management
- ✓ Postoperative vomiting occurs in half the infants and is thought to be secondary to edema of the pylorus at the incision site.
- ✓ In most infants, however, feedings can be initiated within 12-24 hr after surgery and advanced to maintenance oral feedings within 36-48 hr after surgery.

Prognosis cont...

- ✓ The surgical treatment of pyloric stenosis is **curative**, with an operative mortality of **0-0.5%**. Endoscopic balloon dilatation has been successful in infants with persistent vomiting secondary to incomplete pyloromyotomy.
- ✓ The success of laparoscopy depends on the skill of the surgeon.
- ✓ Persistent vomiting suggests an incomplete pyloromyotomy, gastritis, gastroesophageal reflux disease, or another cause of the obstruction

Prevention method

- ❖ Direct application of prevention method is difficult b/c of the exact cause is unknown
- ❖ Therefore ,prevention is focuses on prevention of risk factors, avoiding of using drugs (macrolide ,erythromycin et.)
- ❖ Early diagnosis and management to prevent further complications
- ❖ It require further study to dig out cause to prevent

hernias

Objectives of the presentation

At the end of this session learners are expected

- To define hernia
- Describe the different types of hernia
- Discuss the management of hernia

Introduction

- Hernias comprise approximately 7% of all surgical outpatient visits.
- Inguinal hernia makes up 75% of all abdominal wall hernias
- They affect 1-3% of young children.
- Data from developing countries is limited hence the exact prevalence and incidence is not known.

What is hernia ???

- A sprout and protrusion of tissue or viscus through a weakness or abnormal opening in an enclosing layer.
- an external abdominal wall hernia is an abnormal protrusion of intra-abdominal tissue or viscus, whole or part, through an opening or defect of abdominal wall or pelvic wall

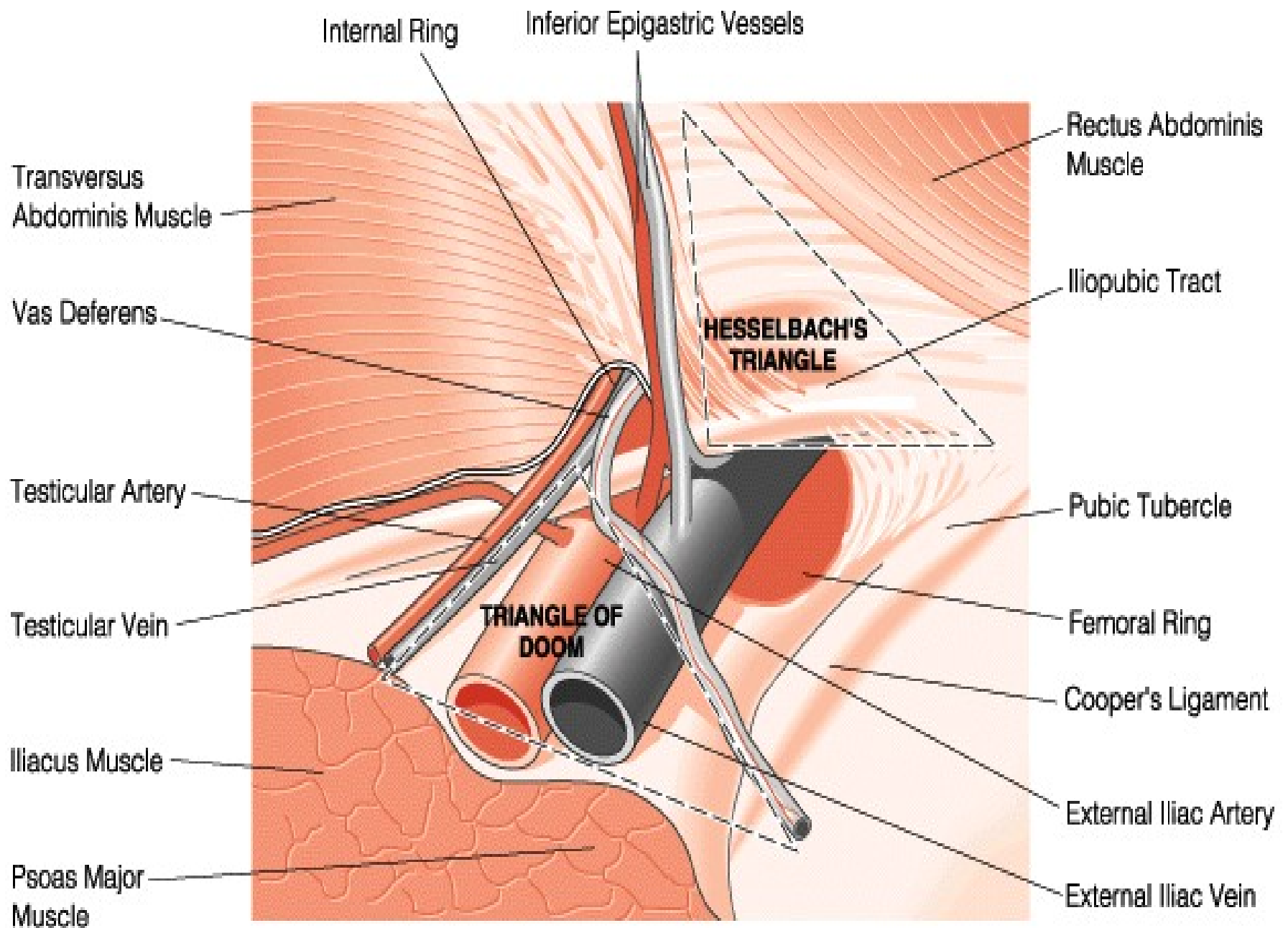
Clinical classification

- Reducible hernia:
- Irreducible hernia:
- Sliding hernia
- Incarcerated hernia
- Strangulated hernia

Special types of hernias

- Richter's hernia: only part of bowel becomes incarcerated or strangulated
- Littre's hernia: incarcerated or strangulated part is a diverticulum of the small intestine,

INGUINAL HERNIAS



Inguinal hernia

- ▶ 90% of external abdominal hernias
- ▶ occur in the groin
- ▶ 99% hernias in infants and children are congenital indirect inguinal hernias.
- ▶ The incidence is up to 10 times higher in boys than in girls.

Cont.

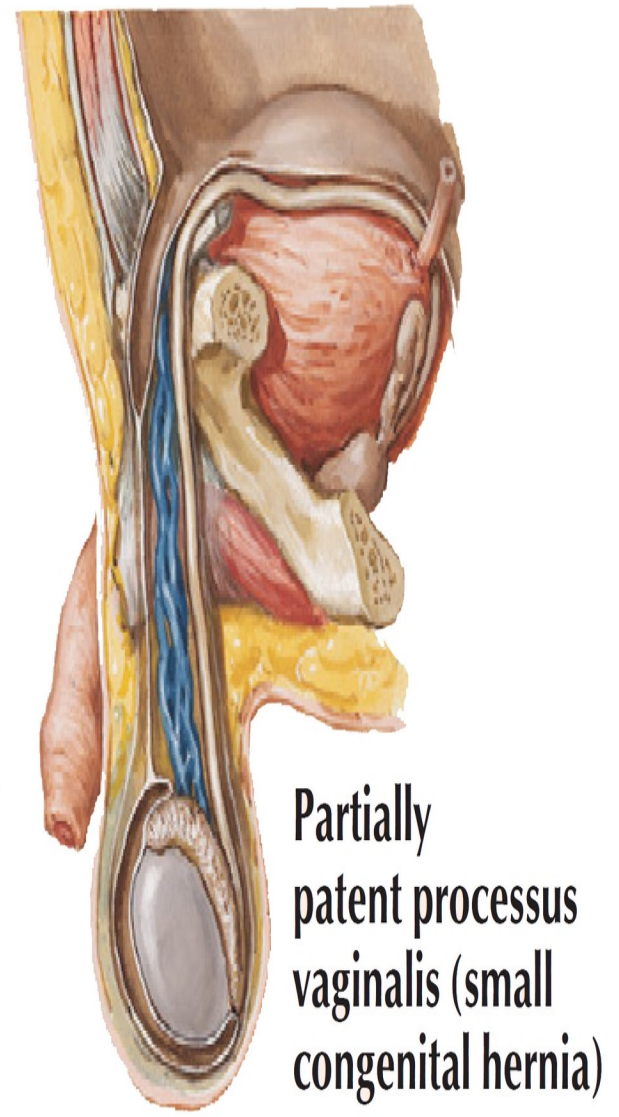
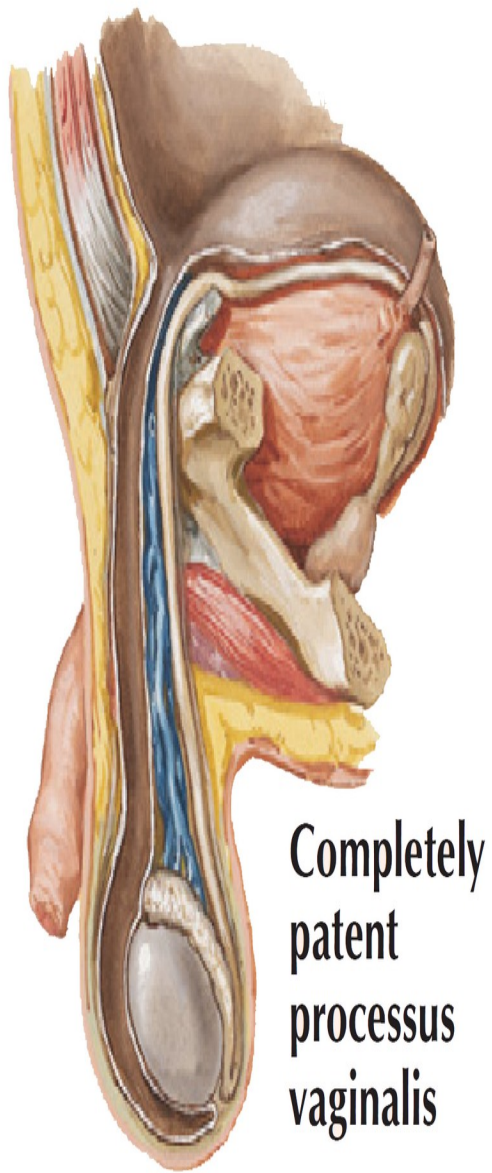
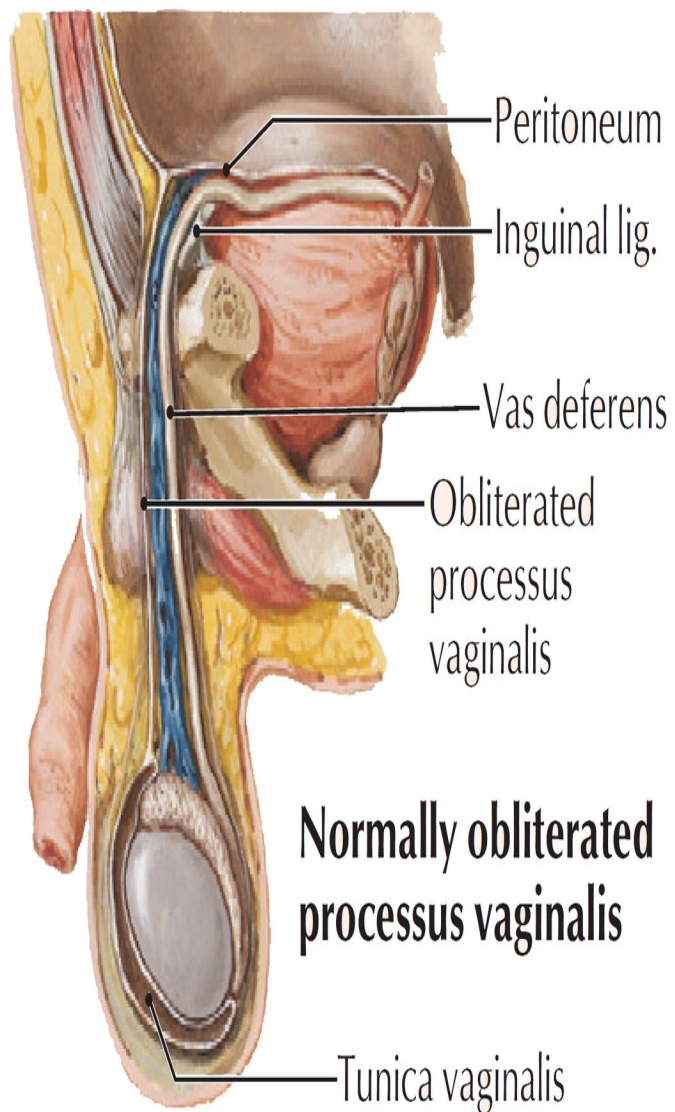
- ▶ Other types of inguinal hernias include direct or acquired (0.5-1.0%) and femoral (<0.5%).
- ▶ Approximately one half of inguinal hernias manifest clinically in the 1st year of life, most in the 1st 6 mo.
- ▶ Premature infants have an incidence of inguinal hernia approaching 30%

Predisposing factors

- ▶ prematurity
 - Cryptorchidism
 - Exstrophy of the bladder
 - Hypospadias
/epispadias
 - Ascites

Indirect inguinal hernia

- ▶ Indirect inguinal hernias in infants and children are congenital.
- ▶ Result from an arrest of embryologic development, or failure of obliteration of the **processus vaginalis**,
- ▶ reasons for failure of closure is unknown



Indirect inguinal hernia cont.

- ▶ an indirect inguinal hernia leaves the abdominal cavity at the internal ring and passes with the structures of the spermatic cord into the scrotum through the superficial inguinal ring directed by the spermatic cord.
- ▶ The neck of hernia located lateral to the inferior epigastric artery to enter the inguinal canal and the sacs lie within the

Incidence

- ▶ The incidence of congenital indirect inguinal hernia in full-term newborn infants is estimated at 3.5-5.0%.
- ▶ male : female ratio is ~6 : 1.
- ▶ About 60% of inguinal hernias occur on the right side, 30% are on the left side, and 10% are bilateral.

Clinical presentation

- ▶ Bulge in the inguinal region or extending into the scrotum.
- ▶ In girls, the mass typically occurs in the upper portion of the labia majora
- ▶ The bulge or mass is most visible at times of irritability or increased intra-abdominal pressure
- ▶ It may be present at birth or might not

Differential diagnosis

1. Direct inguinal hernia , femoral hernia:
2. Hydrocele .
3. An undescended testis:
4. Lymphadenopathy or abscesses of the groin.

Direct inguinal hernia

- are rare in children
- appear as groin masses that extend toward the femoral vessels with exertion or straining .
- the etiology is muscular defect or weakness in the floor of the inguinal canal medial to the epigastric vessels.

Direct inguinal hernia cont.

- Proceeds directly through the posterior inguinal wall
- protrude medial to the inferior epigastric vessels
- They are generally believed to be acquired lesions
- In one third of cases, the patient has a history of a prior indirect hernia repair on the side of the direct hernia.

Indirect Inguinal Hernia	Direct Inguinal Hernia
Pass through inguinal canal.	Bulge from the posterior wall of the inguinal canal
Can descend into the scrotum.	Cannot descent into the scrotum.
Lateral to inferior epigastric vessels.	Medial to inferior epigastric vessels.
Reduced: upward, then laterally and backward.	Reduced: upward, then straight backward.
Controlled: after reduction by pressure over the internal (deep) inguinal ring.	Not controlled: after reduction by pressure over the internal (deep) inguinal ring.
The defect is not palpable (it is behind the fibers of the external oblique muscle).	The defect may be felt in the abdominal wall above the pubic tubercle.
After reduction: the bulge appears in the middle of inguinal region and then flows medially before turning down to the scrotum.	After reduction: the bulge reappears exactly where it was before.
Common in children and young adults.	Common in old age.

Management

Non-operative management

- When an acutely incarcerated hernia occurs, **manual reduction** may be used.
- The patient is placed in hips elevated position.
- After applying an appropriate dose of analgesics and sedation, gentle sustained pressure over the mass may effect reduction in 30 minutes.
- If that effort fails or strangulation may occur, an emergency operation should be done.

Operative treatment



Pre op preparation

- Most pt. are treated surgically
- Increase IAP abnormalities should be evaluated and remedied prior to the repair
- In case of intestinal obstruction and possible strangulation, Broad spectrum AB, NG intubation may be indicated, correction of volume status & electrolyte.

Operative techniques:

A. Simple high ligation of the sac:

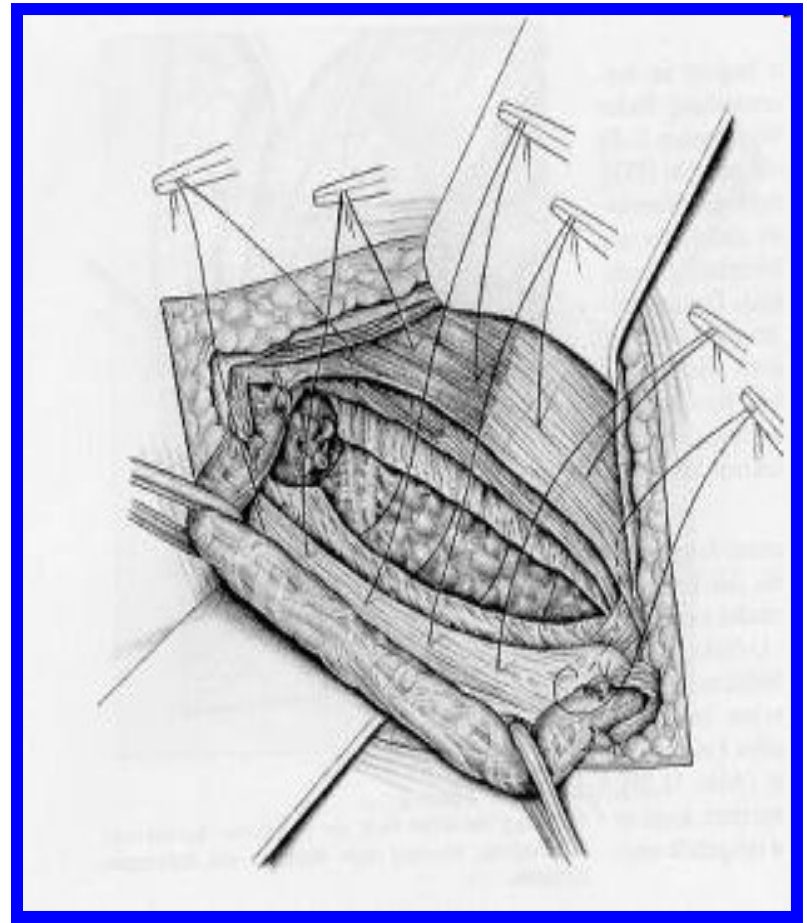
B. Repair of hernia:

- The management of the hernia sac and its contents,
- The repair of the transverse fascial defect.
- The repair and reinforcement of the inguinal canal wall.

Types of repair of hernia

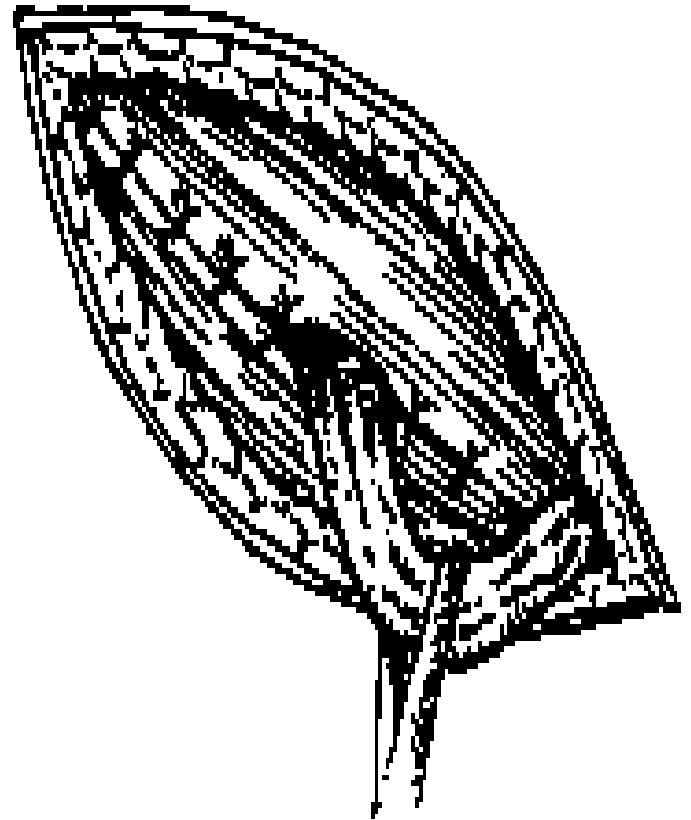
Bassini repair

- used for indirect inguinal hernias and small direct hernias
- The conjoined tendon is sutured to the inguinal ligament



Halsted repair

- places the external oblique aponeurosis beneath the cord and suture it to the inguinal ligament, and leaves the spermatic cord under the skin and subcutaneous tissue, but otherwise resembles the Bassini repair.
- Technique not appreciated because of high incidence of hydrocoels, and testicular atrophy as well as recurrence

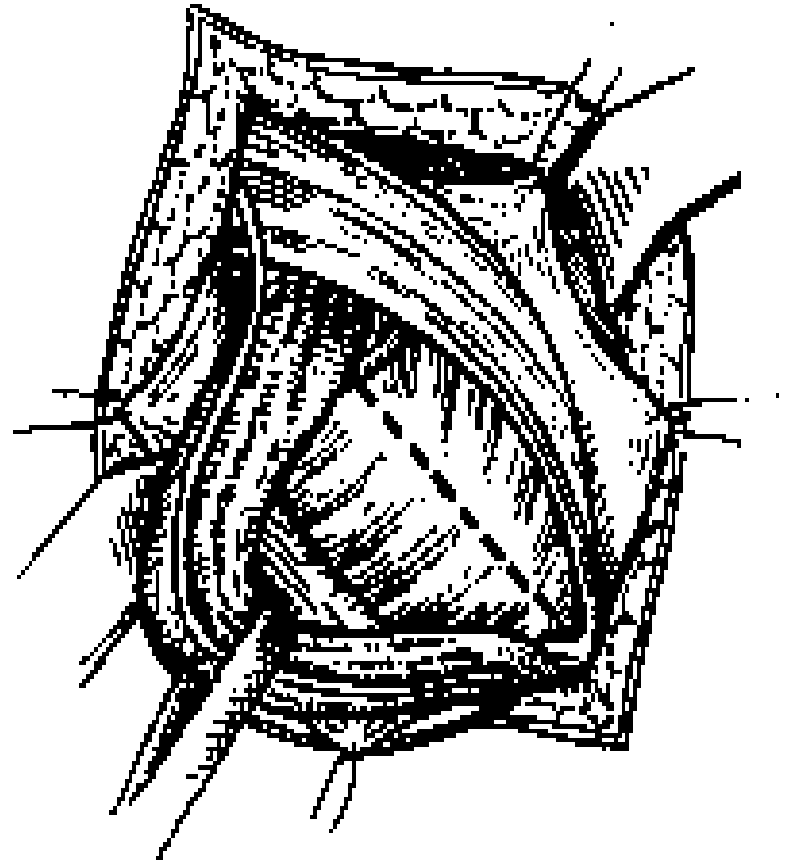


McVay repair

- brings the lower edge of internal oblique muscle and the conjoined tendon further posteriorly and inferiorly to Cooper's ligament, and suture them.
- McVay repair is more appropriate for direct hernia, big indirect hernia, and recurrent hernia, but always requires a relaxing incision to relieve tension and has technical difficulties.

Shouldice repair_

- Before Bassini repair, cut transvers abdominal fascia and suture it overlaply.
- This method can decrease recurrent hernia effectively.



Complications

- Complications after elective inguinal hernia repair uncommon (1.5%)
- with incarceration (10%).
 - recurrence,
 - iatrogenic cryptorchidism
 - bowel ischemia, gonadal infarction, and
 - testicular atrophy related to an incarcerated hernia.

Laparoscopic inguinal hernia repair

- Like the open technique, the laparoscopic technique is fundamentally a high ligation of the indirect inguinal hernia sac (processus vaginalis).

Femoral hernia

- Femoral hernias represent a protrusion through the femoral canal
- Because it has a narrow neck, it is prone for incarceration and strangulation.
- The bulge of a femoral hernia is located below the inguinal ligament and typically projects toward the medial aspect of the thigh.

Femoral hernia

- Are also rare (<1% of groin hernias in children).
- More common in girls than boys, (ratio of 2 : 1)
- Repair of a femoral hernia involves closure of the defect at the femoral canal, generally suturing the inguinal ligament to the pectineal ligament and pectineal fascia.

Diaphragmatic hernia

- DH is communication between the abdominal and thoracic cavities with or without abdominal contents in the thorax.
- The etiology may be congenital or traumatic
- The defect may be at the esophageal hiatus (hiatal), Para esophageal (adjacent to the hiatus), retrosternal (Morgagni), or at the posterolateral (Bochdalek) portion of the diaphragm.

Congenital diaphragmatic hernia (Bochdalek)

Pathology and Etiology

- Although CDH is characterized by a structural diaphragmatic defect, a major limiting factor for survival is the associated **pulmonary hypoplasia**.
- Pulmonary hypoplasia is characterized by a reduction in pulmonary mass and the number of bronchial divisions, respiratory bronchioles, and alveoli.

Cont.

- The pathology of pulmonary hypoplasia and CDH includes abnormal septa in the terminal saccules, thickened alveoli, and thickened pulmonary arterioles.
- Accounts 90% of the hernias seen in the newborn period, with 80-90% occurring on the left side

Epidemiology

- The incidence of CDH is between 1/2,000 and 1/5,000 live births, with females affected twice as often as males.
- Defects are more common on the left (85%) and are occasionally (<5%) bilateral
- Most cases of CDH are sporadic, but familial cases have been reported.

Diagnosis and Clinical Presentation

- CDH can be diagnosed on prenatal ultrasonography (between 16 and 24 wk. of gestation) in > 50% of cases
- High-speed fetal MRI can further define the lesion
- Respiratory distress is a **cardinal sign** in babies with CDH.
- Early respiratory distress, within 6 hr. of life,

Cont.#

- Children with CDH also have a scaphoid abdomen and increased chest wall diameter.
- Bowel sounds may also be heard in the chest with decreased breath sounds bilaterally.
- The point of maximal cardiac impulse may be displaced away from the side of the hernia if mediastinal shift has occurred.
- A chest radiograph and passage of a nasal gastric tube are all that is usually required to confirm the diagnosis

Treatment

Initial management

- Aggressive respiratory support is often needed in children with CDH
- A pre ductal arterial oxygen saturation (Sao₂) value $\geq 85\%$ should be the minimum goal.
- Prolonged mask ventilation in the delivery room, which enlarges the stomach and small bowel and thus makes oxygenation more difficult, must be avoided

Cont.

- Factors that contribute to pulmonary hypertension should be avoided.
- Routine use of inotropes is indicated in the presence of left ventricular dysfunction

Ventilation stratégies

- Conventional mechanical ventilation Is the 1st modality to be used
- Pressure-limited ventilation with the rate set between 30 and 60 breaths/min reduces the risk of lung injury.

Surgical repair

- The ideal time to repair is under debate but most centers wait at least 48 hr. after stabilization and resolution of the pulmonary hypertension.
- delayed until the child can return to conventional ventilation.

Foramen of Morgagni Hernia

- accounts for 2-6% of diaphragmatic hernias
- Antero medial diaphragmatic defect through the foramen of Morgagni
- Failure of the sternal and crural portions of the diaphragm to meet and fuse produces this defect.
- are more commonly right-sided (90%) but may be bilateral
- The majorities of children with these defects are asymptomatic and are diagnosed beyond the neonatal period

Cont.

- The diagnosis is usually made on chest radiograph
- Chest CT will confirm the diagnosis.
- When symptoms occur, they can be recurrent respiratory infections, cough, vomiting, or reflux; in rare instances, incarceration may occur.

- Repair is recommended for all patients in

Para esophageal Hernia

- Para esophageal hernia is differentiated from hiatal hernia in that the gastro esophageal junction is in the normal location.
- The herniation of the stomach alongside or adjacent to the gastro esophageal junction is prone to incarceration with strangulation and perforation.

Umbilical hernia

- is due to imperfect closure or weakness of the umbilical ring
- Often associated with **diastasis recti**
- Black race and low birth weight are at risk
- The hernia appears as a soft swelling covered by skin that protrudes during crying, coughing, or straining and can be reduced easily through the fibrous ring at the umbilicus

Cont.

- The hernia consists of omentum or portions of the small intestine.
- The size of the defect varies from < 1 cm in diameter to as much as 5 cm, but large defects are rare.
- Most umbilical hernias that appear before the age of 6 mo. disappear spontaneously by 1 yr. of age
- Even large hernias (5-6 cm in all dimensions) have been known to disappear spontaneously by 5-6 yr. of age

Cont.

- Surgery is not advised unless
 - the hernia persists to the age of 4-5 yr.
 - Causes symptoms,
 - becomes strangulated, or
 - becomes progressively larger after the age of 1-2 yr.
- Defects exceeding 2 cm are less likely to close spontaneously.

Epigastric hernias

- Epigastric hernias are ventral hernias in the midline of the abdominal wall between the xyphoid and the umbilicus
- result from defects in the decussating fibers of the linea alba.
- are more likely congenital than acquired
- Most epigastric hernias are small and

Epidemiology

- It has reported incidence in childhood which varies from $<1\%$ to as high as 5%
- Epigastric hernias may be single or multiple
- 2-3 times more common in males than females.
- The defect typically contains only

Treatment

- operative repair is the recommended treatment.
- A limited transverse incision is made over the mass and dissection is performed to delineate the edges of the fascial defect.
- If herniated fat is present, it is dissected free of the subcutaneous tissues and can be reduced or ligated and excised.
- The defect is closed using absorbable suture.

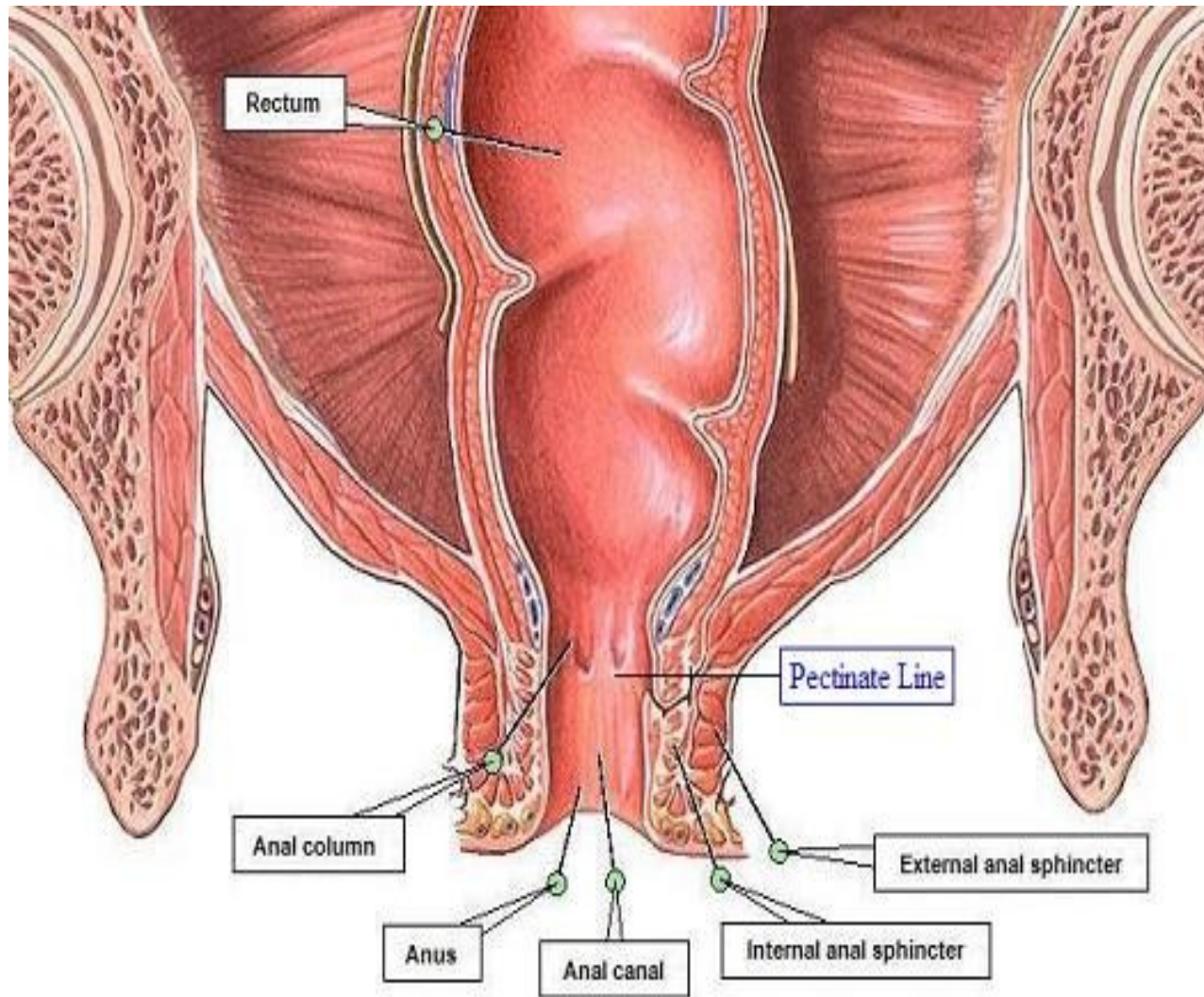
Rectal Anomalies (Imperforate anus) In Children



Introduction

- Ano-rectal describes the last bit of the bowel: the anus and the rectum .
- The anus is the opening in your bottom, through which stool are pushed out. The rectum is the bit of bowel before the anus.

Ano rectal Anatomy



EMBRYOLOGY

- The hindgut forms early as the part of the primitive gut tube that extends into the tail fold in the 2nd wk of gestation.
 - At about day 13, it develops a ventral diverticulum, the allantois or primitive bladder
 - The junction of allantois and hindgut become the cloaca, into which the genital, urinary, and intestinal tubes

Cont...

- This is covered by a cloacal membrane. The urorectal septum descends to divide this common channel by forming lateral ridges by the middle of the 7th wk.
- Opening of the posterior portion of the membrane (the anal membrane) occurs in the 8th wk. Failures in any part of these processes can lead to the clinical spectrum of anogenital anomalies.

Cont...

- Ano-rectal malformations is one of the most common congenital defect which occurs during the fifth to seventh weeks of fetal development
- It comprises of wide spectrum of diseases, which can affect both sex and involve the distal anus and rectum as well as the urinary and genital tracts.
- With these defects, the anus (opening at the end of the large intestine through which stool passes) and the rectum (area of the large intestine just above the anus) do not develop properly

Cont...

- Defects range from the very minor and easily treated with an excellent functional prognosis, to those that are complex, difficult to manage, are often associated with other anomalies, and have a poor functional prognosis

Causes

- unknown
- But In some cases, environmental factors or drug exposure during pregnancy and genetic component may play a role, but this is still unclear.
- As early as the 2007, it was recognized that there was an increased risk for a sibling of a patient with ARM to be born with malformation, as much as 1 in 100, compared with the incidence of about 1 in 5000 in the general population(***Orphanet Journal of Rare Diseases 2007***)
- The interesting category of boys with imperforate anus and no fistula occurs mainly in children with trisomy 21

Classification

- Anorectal malformations represent a wide spectrum of defects and classified as *“low,” “intermediate,” and “high”* defects.
- The classification presented here attempts to group together defects that have common diagnostic, therapeutic, and prognostic features

	HIGH	INTERMEDIATE	LOW
Female	Anorectal-agenesis	Rectovaginal fistula	Anovestibular fistula
	Recto-vaginal fistula	Rectovestibular fistula	Anoperineal(anocutaneous fistula
	No fistula	Anal agenesis	Anal stenosis
	Rectal atresia		
cloaca(rare malformation)			
Male	Anorectal agenesis	Bulbar fistula	Anopirneal(anocutaneous fistula
	Recto prostetic fistula	Anal agenesis	Anal stenosis

MALES ANO-RECTAL ANATOMY

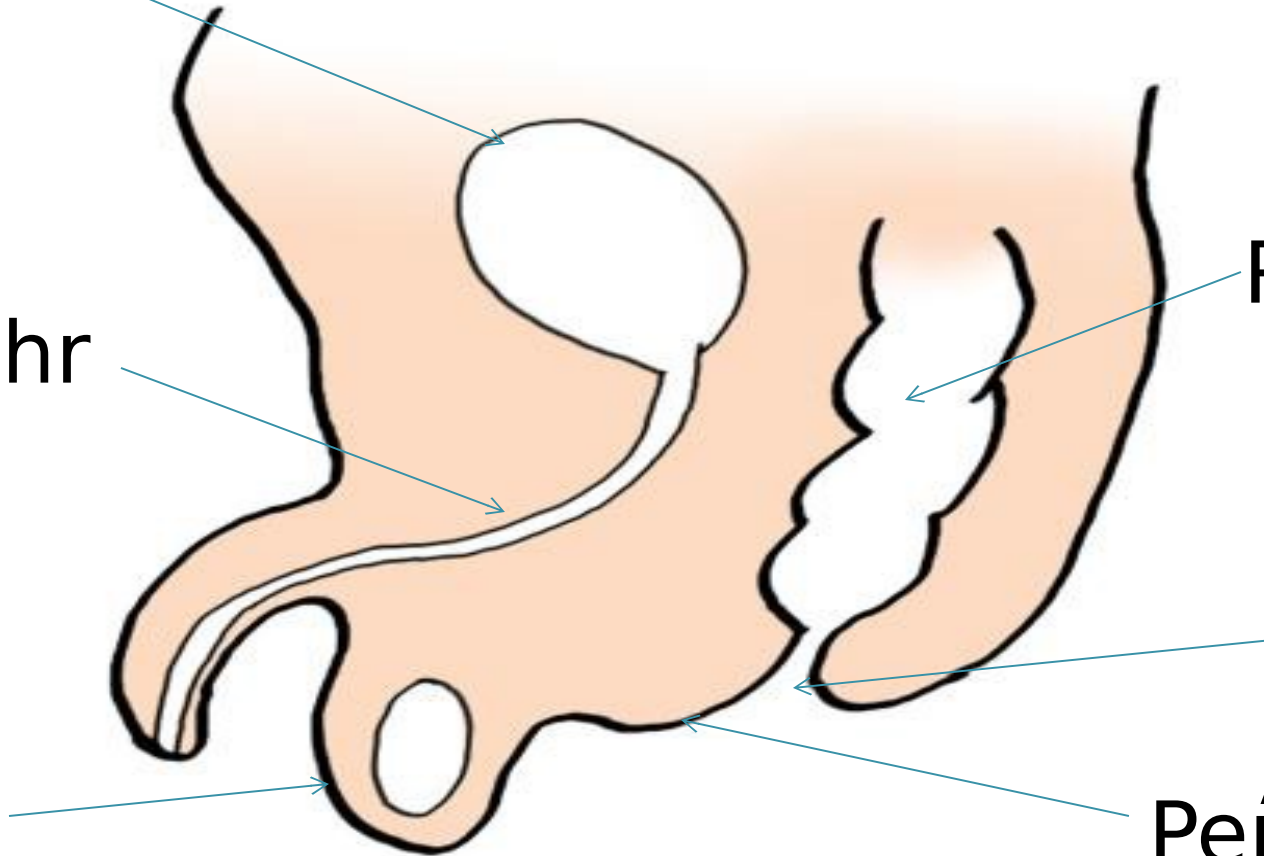
Bladder

Urethra

Rectum

Anus
Perineum

Testicles
and scrotum



MALES ANO-RECTAL DEFECTS

1. Cutaneous (perineal) Fistulas

- Mild forms of imperforate anus with perineal fistula
- Often called *anal stenosis or anterior ectopic anus, covered anus, anal membrane, anteriorly mislocated anus*
- There are well-formed buttocks and often a thickened raphe or “bucket handle.”
- Only the lowest part of the rectum is anteriorly misallocated .



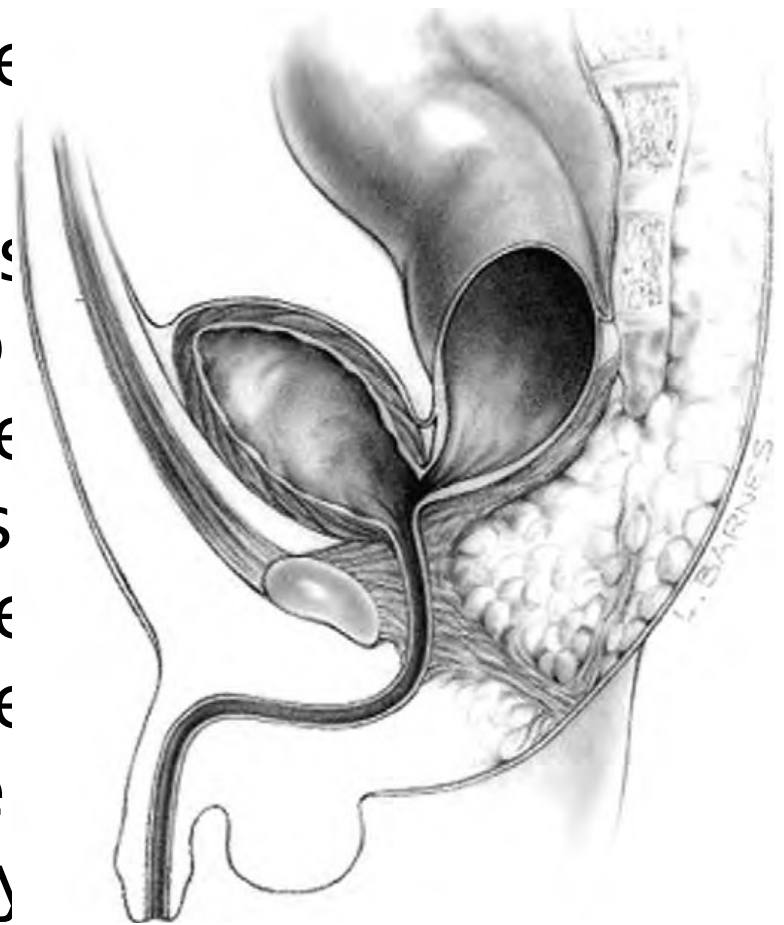
Rectobulbarurethral fistulas

- The most common in boys
- The sphincter mechanism is satisfactory, the sacrum may be underdeveloped, and an anal dimple is present



3. Recto-Bladder Neck Fistulas

- In this defect, the rectum opens into the bladder neck
- The patient usually has a poor prognosis for bowel control because the levator muscles, the striated muscle complex, and the external sphincter frequently are poorly developed.



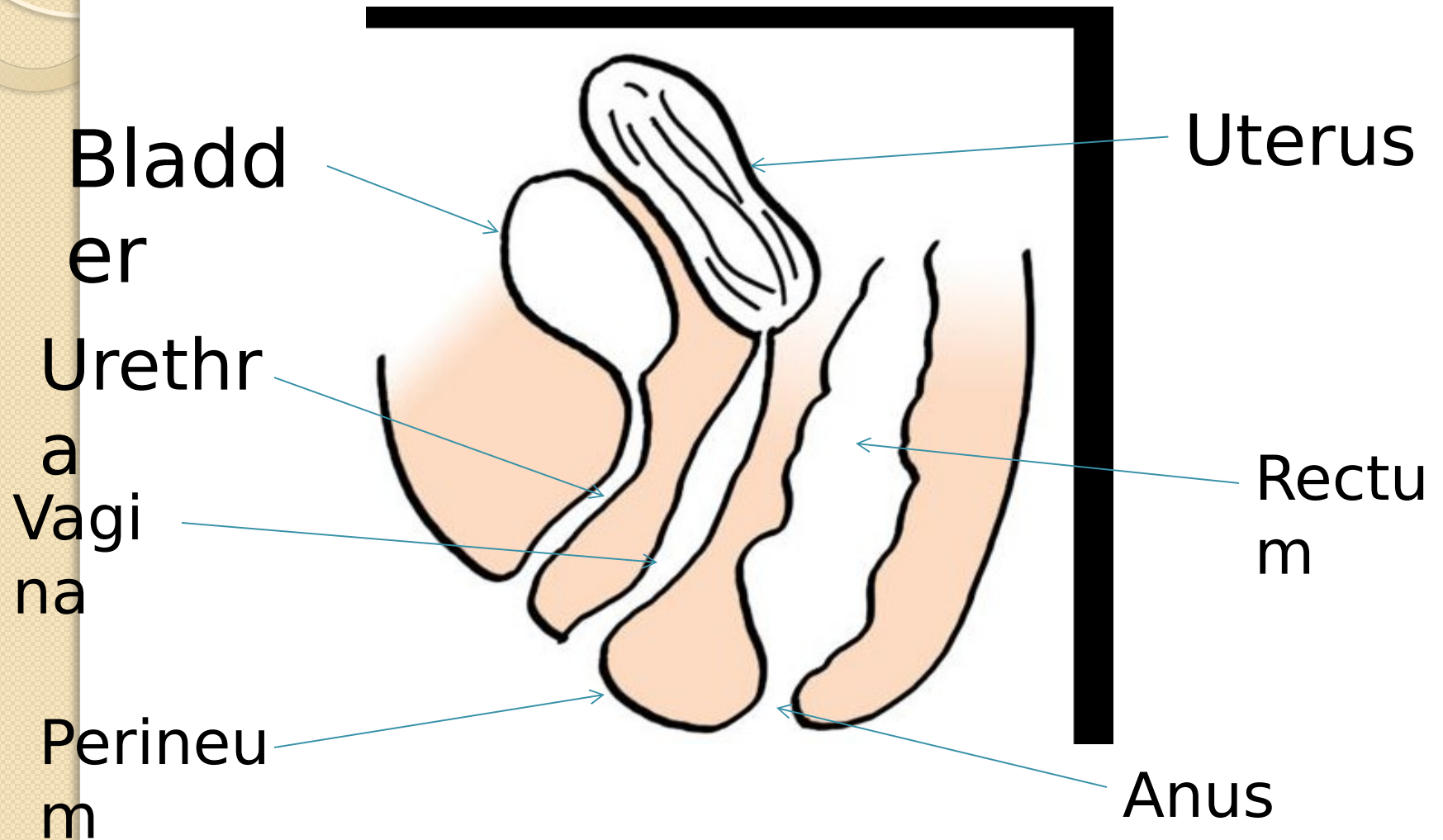
4. Imperforate Anus without Fistula

- This unusual defect have a well-developed sacrum and good muscles, and have a good prognosis in terms of bowel function.
- The rectum usually terminates approximately 2 cm from the perineal skin.
- In some boys the rectum ends in a blind pouch and it does not have any communication

5. Rectal Atresia

- Rectal atresia is a rare defect occurring in only 1% of ano-rectal anomalies.
- It has the same characteristics in both sexes.
- The unique feature of this defect is that affected patients have a normal anal canal and a normal anus.
- The defect is often discovered while rectal temperature is being taken. An obstruction is present about 2 cm above the skin level. These patients need a protective colostomy.

FEMALE ANORECTAL ANATOMY



1. Anoperineal (cutaneous) Fistulas

- From the therapeutic and prognostic viewpoint, this common defect is equivalent to the perineal fistula described in the male patient.
- The rectum is well positioned within the sphincter mechanism, except for its lower portion, which is interiorly located.
- The rectum and vagina are well separated



**low defect
in female**

2. Rectovestibular Fistulas

- Recto-vestibular fistula is the most common defect in girls and has an excellent functional prognosis.
- The diagnosis is based on clinical examination.

A meticulous inspection of the neonatal genitalia allows the clinician to observe a normal urethral n vagina, with a vestibule.



3. Recto-vaginal fistula

- The bowel open directly into vagina
- rare

4. Imperforate Anus without Fistula

for this defect in female patients carries the same therapeutic and prognostic implications as described in male patients

5. Cloaca

- This group of defects represents the extreme in the spectrum of complexity of female malformations.
- A cloaca is defined as a defect in which the rectum, vagina, and urinary tract meet and fuse, creating a single common channel.
- The diagnosis of persistent cloaca is a clinical one.
- This defect should be suspected in a female born with imperforate anus and small-looking genitalia.

Cont...

- Careful separation of the labia discloses a single perineal orifice.



Diagnosis

- History
- Clinical manifestaion
- Physical examination
- **Imaging studies:-**
 - Invertogram (upside-down x-ray)
 - CT scan
 - ▢ MRI
 - ▢ Cardiac echocardiogram
 - ▢ Abdominal ultrasound and spinal ultrasound
 - ▢ Cross-table lateral radiograph of patient
 - ▢ A plain x-ray of the entire sacrum,

Differential Diagnosis

- Hirschsprung's disease
- Meconium plug syndrome
- Meconium ileus
- Small left colon syndrome
- Hypoganglioneurosis
- Neuronal intestinal dysplasia type
- Megacystis microcolon intestinal
hypoperistalsis syndrome

MANAGEMENT

Newborn

Male

Ano-rectal

Malformation

During the first 24 hours,

the child should:-

- Take **nothing orally**
- Receive ***intravenous fluids***
- and ***antibiotics***

and be evaluated for associated defects that may represent a threat to life.

Cont...

- These include:-
 - **NGT** to exclude esophageal atresia
 - **Echocardiogram** to exclude cardiac malformations
 - ***Radiograph of the lumbar spine and the sacrum***
 - **Spinal ultrasonogram** to evaluate for a tethered cord.
 - ***Ultrasonography of the abdomen*** will evaluate for renal anomalies.
 - **Urine analysis**

After 24 hours

Re evaluate

- If the child has signs of a perineal fistula, treatment is by doing an anoplasty, without a protective colostomy, this can be performed during the first 48 hours of life.
- if there is no meconium on the perineum, we recommend obtaining a ***cross-table lateral radiograph*** with the patient in the prone position

Cont...

- If air in the rectum is located below the coccyx, and the patient is in good condition with no significant associated defects, performing a posterior sagittal operation with or without a protective colostomy
- Conversely, if the rectal gas does not extend beyond the coccyx, or the patient has meconium in the urine, an abnormal sacrum, or a flat bottom, a colostomy should be done.
- then perform a posterior sagittal anorectoplasty 1 to 2 months later, provided the child is gaining weight

Management

Newborn Female Ano-rectal Malformation

During the first 24 hours,
the child should

- Be examined carefully
(perinealexamination)
- Take **nothing orally**
- Receive ***intravenous fluids*** and ***antibiotics***
- ❖ Evaluated for associated defects that may represent a threat to life

- These include
 - **NGT** to exclude esophageal atresia
 - **Echocardiogram** to exclude cardiac malformations, esophageal atresia.
 - ***Radiograph of the lumbar spine and the sacrum***
 - **Spinal ultrasonogram** to evaluate for a tethered cord.
 - ***Ultrasonography of the abdomen*** will evaluate for renal anomalies.

Management Newborn Female Anorectal Malformation



Complications

- There are several complications related to operative intervention and repairs of anorectal malformations in general.

1. Wound infection.
2. Anal strictures
3. Constipation
4. Incontinence
5. Patients with anal absent sacrum usually have permanent fecal and urinary incontinence

Nursing management

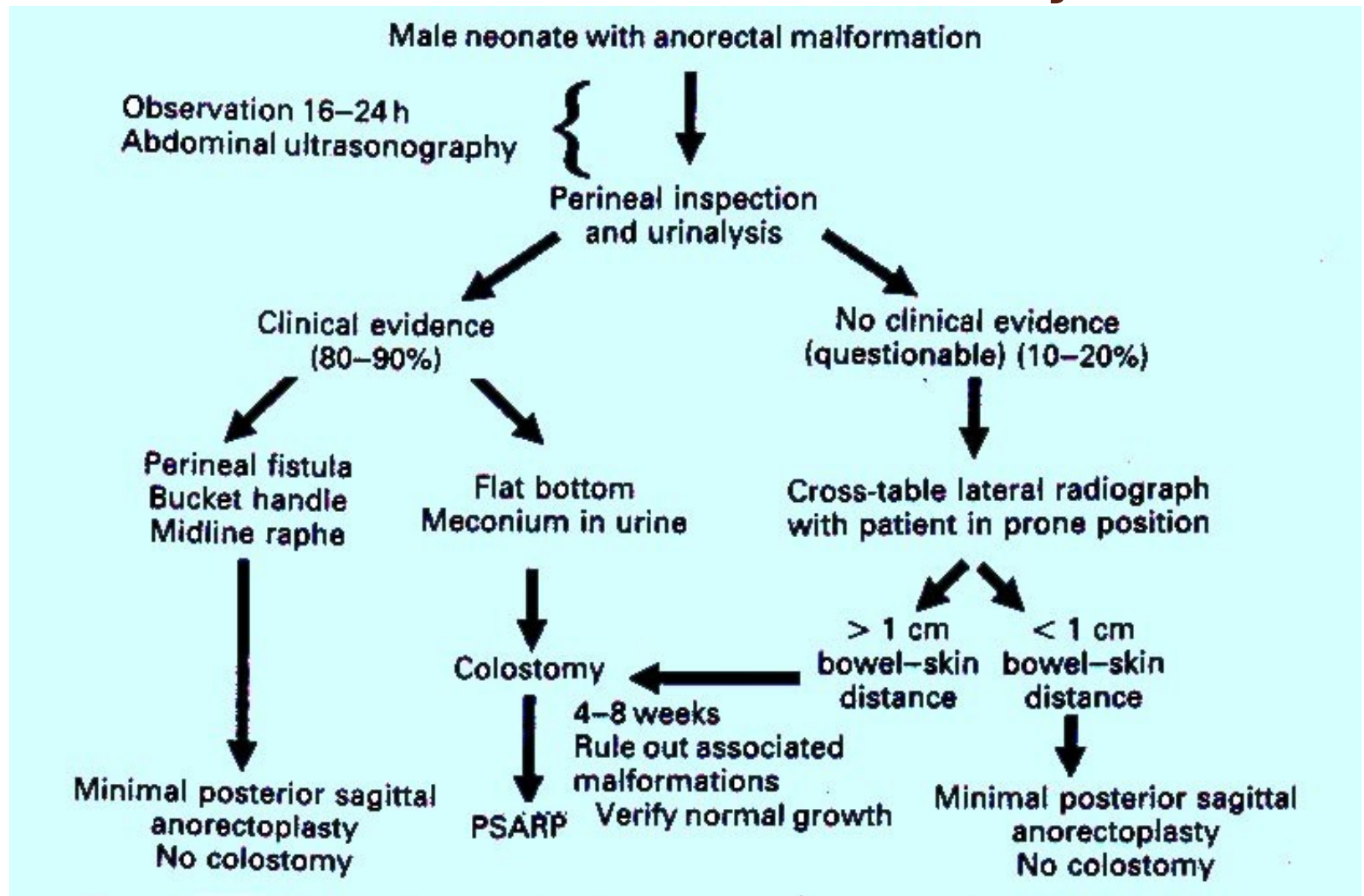
- Wound care
- Assess stoma appearance and surrounding skin condition frequently
- Position a collection bag or drainable pouch over the stoma.
- Empty a drainable pouch or replace the colostomy bag as needed or when it is no more than one-third full

Cont...

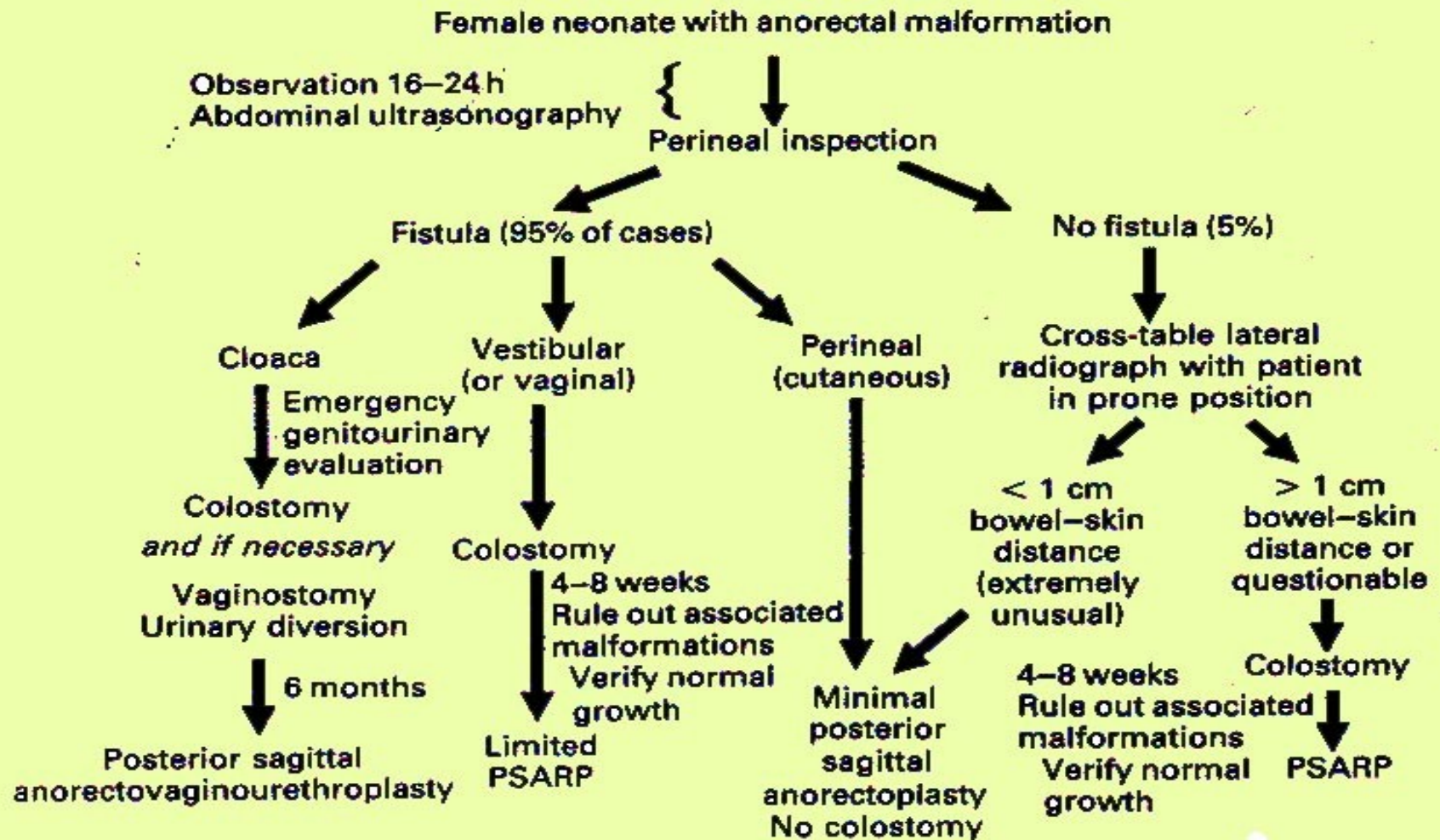
- Good skin and stoma
- Prior to discharge provide:
 - written, verbal, and
 - Psycho-motor instruction (dilatation, diet) on colostomy care,
 - pouch management, skin care, and irrigation for the client the diet for a client with a colostomy.

- All infants with imperforate anus should undergo a comprehensive workup for associated anomalies: passage of a nasogastric tube, renal ultrasound, echocardiogram, spinal ultrasound and plain radiographs of the axial skeleton and forearms
- Infants without a fistula or with a fistula to the urinary tract are best treated initially with a diverting colostomy and delayed repair.
- Repair of cloacal anomalies can be exceptionally challenging and requires experience, meticulous planning and precise surgical technique

Management protocol of Congenital Anorectal Malformation in Boys



Management protocol of Congenital Anorectal Malformation in Girls



Management of a child with intestinal parasitosis

Ascariasis

- Commonest and most widespread nematode infestations of the small intestine.
- Is round worm.
- Children are more frequently and more heavily infested than adults

Etiology

- Ascaris lumbricoides
- **Clinical picture**
 - Vague abdominal discomfort
 - Occasionally a worm may leave the body in vomitus or stool

- **Diagnose**

- Stool test – show ova (egg) of *Ascaris lumbricoids*.
 - History of adult worm in the stool or vomitus.

Complications

May occur

- in heavy infestations or
- due to wandering worms such as:
 - Intestinal obstruction by a tangled ball of worms
 - Vomiting of worms causes swelling of glottis, difficulty of breathing.
 - Blockage of bile duct cause obstructive jaundice.
 - Liver abscess due to migration to liver tissue

Management

- Mebendazole syrup 100mg po BID for 3 days. Not use for <1 years age.
- Alternative drugs:
 - Levamisole (ketrax) 5mg /kg single dose
 - Piperazine (antepar) syrup po 150mg/kg single dose
 - Refer all patients of suspected of intestinal obstruction.

Nursing consideration on prevention

- Give health education on:
 - The need for and the proper use of latrines
 - Proper hand washing
 - Avoidance of food which has fallen on the floor.
 - Proper disposal of dirt.
 - Washing of fruit and vegetables before eating.

Trichuriasis

- is a nematode infection of the large intestine.
- It is also known as whipworm.
- It is common in hot, humid climates.

Etiology

- *Trichuris trichiura*
- Transmission egg passed with feces
- Embryonation in soil.
- Auto infection is impossible.

Transmission -ingestion of emryonated eggs.

Clinical manifestations

- Mild infections are asymptomatic, but heavy infections result in
 - abdominal discomfort
 - Bloody diarrhea
 - Loss of weight
 - Anemia
 - Prolapse of rectum.

- **Diagnosis**

- Stool examination
 - ova of the *Tricuris trichiura*

- **Management**

- Mebendasole syrup 100 mg BID for 3 days- not use for children, <1year
- Albendazole 20mg/kg bid for 03 days

- **Prevention**

- Same for Ascariasis

Entrobiasis

- **Enetrobiasis** – is thread or pinworm of an intestinal disease caused by Enterobius vermicularis.
- **Etiology** - Enterobius verumicaloris
- **Transmission**- fecal-oral route.
 - Infection is maintained by direct transmission from anus-to-mouth (auto-infection) or indirect way
 - Gravid worms migrate to the rectum to discharge eggs on the perennial skin, especially during the night.
 - This causes itching and consequent scratching.
 - Auto infection is then easily established.

- **Clinical manifestations**

- Pruritus ani - main symptom , secondary bacterial infection.

- **Diagnose:**

- Apply transparent adhesive tape over the anus in the early morning, stick the tape on to a slide and search for typical eggs under microscope.

- **Management:**

- Mebendazole 100mg as a single dose for all age
 - Albendazole 20mg/kg bid for 03 days for < 1 years

- **Prevention and control**

- Personal hygiene is essential; bathing and hand washing
 - Cut nails short, wash underclothes, night clothes, and bed clothes
 - Practice proper use of latrine
 - Treat the whole family
 - Give health education to infected individuals to avoid reinfection.

Hook worm

- Infection with hookworm may vary from asymptomatic infection to a chronic debilitating disease caused by severe iron deficiency anemia and in some cases loss of protein from the bowel leading to edema.
- This depends on the extent of the disease and nutritional state of the person.
- The infection is also known as ankylostomiasis or hookworm disease.
- Nutritional and daily iron intake and total worm load determine whether a carrier develop hookworm anemia or not.

WHO standard for lower limits of normal Hgb

-
- At birth ----- 14-20 g/ dl = (g/100ml)
- < 6 month ----- 10g/dl
- 6month – 4yrs ----- 11g/dl
- 5-14 years----- 12g/dl

- There are two types of hook worms,
both nematode
 - Necator Americanus
 - Ankylostoma duodenale

- The eggs are already embryonated when passed with the feces.
- It is changed to larvae in the fleeces.
- The larvae leave the feces and bury them selves in moist damp soil.
- These larvae are called **rhabditiform** and are **not infective** before they have changed into the **filariform** stage. (in about 5 day)

- When they touched with the human leg or foot, they penetrate actively through the skin and reach the lungs via the venous system and the right side of the heart.
- Then they penetrate the alveoli and reach the larynx pharynx then swallowed and reach duodenum in 3-5 days after penetrating the skin.

- **Clinical manifestations**

- Asymptomatic
- Anemia of iron deficiency with heavy worm load.
- It suck blood → loss of RBC, iron protein especially albumin .
- Hb < 5g / dl

- In sever anemia:
 - Fatigue , pallor, edema, tachycardia, heart dilation, murmur → CHF
- Cough - due to lung passage
- In G. I. T dyspepsia, abdominal pain, distension some times diarrhea

- **Diagnose:**
- Stool test for ova of hookworm
- **Management:**
- Anemia is treated with ferrous sulphate for at least 2 months. (even when the anemia is severe pt respond quickly and well to iron therapy)
- Mebendazole 100 twice day for 03days
- Pyrantele pamoate 10mg/kg daily for 03day.

- **Prevention and control**
- Wearing of shoe will prevent infection
-

Stongloidiasis

is an infection caused by a nematode worm.

- The adult female worm live in the mucosa of the duodenum and jejunum.
- Infections are not usually very severe but extremely heavy infection (e.g. in AIDS or after immune suppressive drugs) may result in death because of mal-absorption syndrome.

- **Etiology**

- *Strongyloides stercoralis*
- Infective larvae are usually found in the stools.
- These larvae may either develop into free-living adults which continue to reproduce outside the body or they may develop directly into infective filariform larvae which penetrate the skin.

- The rest of the cycle is similar to hook worm infection
- Because of the direct development into the infective stage, autoinfection is common.
- Even within the bowel, the larvae may become infective and penetrate the bowel wall. This is called endogenous re-infection.

- **Clinical manifestations**

- Usually asymptomatic.
 - The continuous re – infection may cause urticaria.

- **Diagnose:** form larvae in fresh stool.

- **Management:**

- mebendazole 100mg BID for 3 days- is the drug of choice
 - Alternative -thiabendazole (mintezol) 25 mg/ kg bid for 02 days

- **Prevention**
- Same as ascariasis
- Teach to wear shoes
-

Taeniasis

- Taeniasis – is an infection of humans by tape worms.
- **Etiology:**
 - Taenia saginata
 - Taenia solium
 - Echinococcus granulosus
 - Hymenolepiasis nana

- Most cases of taeniasis reported in eastern Africa are caused by *taenia saginta* (beef tape worm)
- The disease is especially common in areas where beef is eaten raw or only lightly cooked.
- In southern and central Africa taeniasis due to *taenia solium* (the pork tape worm) has been reported.
- The cysticercus stage of *Taenia solium* in humans can cause serious problems such as epilepsy and death.

- **Epidemiology**

- The adult tapeworms live in the small intestine of humans.
- Broken segments of the worm containing the gravid uterus and/or the eggs are passed in stools.
- The eggs are ingested by cows or pigs.

- In the gastro intestinal tract of the animals, the embryos hatch and penetrate the bowel wall and are carried via the blood stream to striated muscles.
- Here the larvae invaginate, grow and form the infective cysts.
- When a human ingests meat containing cysts get dissolved by the gastric acid in the stomach to release embryos.

- The taenia saginta embryo attaches itself to the wall of the small bowel by its head and grows in to an adult worm.
- The taenia solium embryo may also behave differently, it instead penetrates the bowel wall of the human as it does the pig and it is carried to organs like striated muscle or the brain by the blood stream.

- **Clinical manifestations**

- Most infections with *T. saginata* cause no signs or symptoms.
- In some people, loss of wt, pruritus ani.
- *T. solium* infections are dangerous, especially when the cysticerci invade the brain.
- Patients may present with epilepsy or other neurological signs and muscular pains.

- **Diagnose**

- Presence of the segment in the stool
- Ova in the stool

- **Management**

- Mebendazole 200mg BID/3days
- [Praziquantel](#)
- Niclosamide is effective against both *T. sagina* and *T. solium* infections, For child Niclosamide 40 mg/ kg po once.

- **Prevention and control**

- proper feces disposal
- Meat inspection
- Condemn all infected meat
- Give health education about the danger of eating raw meat
- Deep freezing of meat will kill all cysticerci in 24 hrs.

Thank You for
Being Patient
Till the End

