

# CONTEMPORARY PEDIATRICS

## *TOP 10 PEDIATRIC SURGERY REFERRALS*

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UNIVERSITY OF KENTUCKY



UK HealthCare  
Kentucky Children's Hospital

# WHO AM I

- **Sean Skinner, M.D.**

- Originally from Chicago
- Married
- 6 month old daughter
- Started at UK Aug 2008



- **Fellowship:**

- University of Michigan- Surgical Critical Care- 1 year /Pediatric Surgery
- University of Oklahoma- Pediatric Surgery- 2 years

# AAP Guidelines for Pediatric Surgical Referral

- Patients 5 years or younger who may need surgical care
  - UK Pediatric Surgery- All newborn to 18 year old children
- Infants and children with perforated appendicitis
- Seriously injured infants and children
- Infants, children, and adolescents with solid malignancies
- Minimally invasive procedures
- Infants and children with medical conditions that increase operative risk

*PEDIATRICS, Volume 110, Number 1, Pages 187-191, July, 2002*

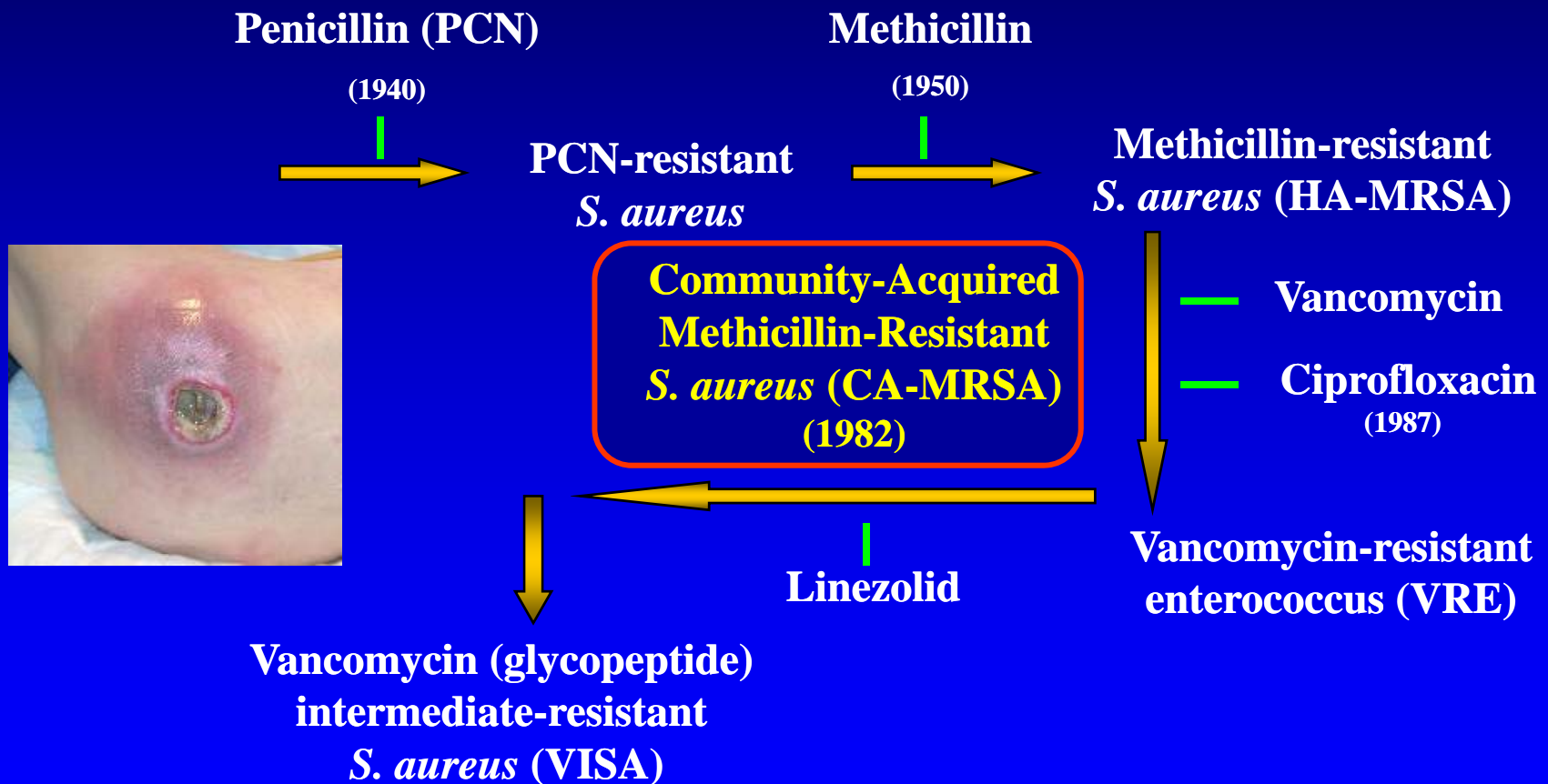
# TOP 10

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## 1. SKIN/SOFT TISSUE INFECTIONS

# SKIN/SOFT TISSUE INFECTIONS

Overuse of antibiotics has led to resistance- Ubiquitous SMART BUG



# COMMUNITY ACQUIRED- MRSA

## Definition:

- Infection isolated in outpatient setting or within 48-72 hours of admission to healthcare facility
- No previous MRSA infection
- No permanent medical devices
- Otherwise healthy child
- PVL gene expressed
- No previous history in last year (admission, dialysis, surgery)

# PVL TOXIN

- PVL = Panton-Valentine-Leukocidin toxin
  - Implicated in skin and soft tissue necrosis
  - Attacks soft tissues
  - “Solid” mass, Cellulitis , no fluctuance, necrosis
    - “spider bite”
  - Other toxins
- Not liquid pus



# EPIDEMIOLOGY

- Clusters of outbreaks
  - Sports teams
  - Inmates
  - Daycare attendees
  - Health care workers (families)
  - Tattoo / piercings
- Risk Factors
  - Age <2
  - Previous exposure
  - Crowding
  - Poor hygiene
  - Moist environments



# PRESENTATION

SINGLE OR MULTIPLE



# TREATMENT

- Vancomycin IV
- Linezolid IV
- Clindamycin IV/PO
- Bactrim PO

# TREATMENT

Is an antibiotic needed all the time?

## Consider:

- Severity and rapidity of progression/cellulitis
- Signs/symptoms of systemic illness
- Associated co-morbidity
- Extremes of patient age
- Location of abscess
- Lack of response to I&D alone
  - Is I&D adequate?

# INTERVENTION

## “Office”

- Bedside
  - No sedation
- Single site, very small
- Young or “Office”
- Local analgesia
- Sedated monitored setting
  - PICU, OR, Recovery room
  - Face, genitalia, multiple sites, younger

# OPERATIVE INCISION & DRAINAGE

Prep and Drape



Incision over most fluctuant area



Break-up all loculations



Irrigate



Pack tightly



# WHEN TO REFER

## Guidelines

- Very small child
- Systemic signs (IV abx need)
- Failed office drainage
- Anytime you don't feel comfortable
- Multiple sites



# PROBLEM IN KENTUCKY?

## Scope of problem at KCH

- Number of ORs with CPT codes 10060-61 (SSI drainage)
- 2003-04 ~40
- 2006-07 275
- 2007-08 296

## Costs

- Hospital stay with IV antibiotics
- OR time/cost
- +/- PO antibiotics at home
- Open wound care
- Parents lost work time

# TOP 10

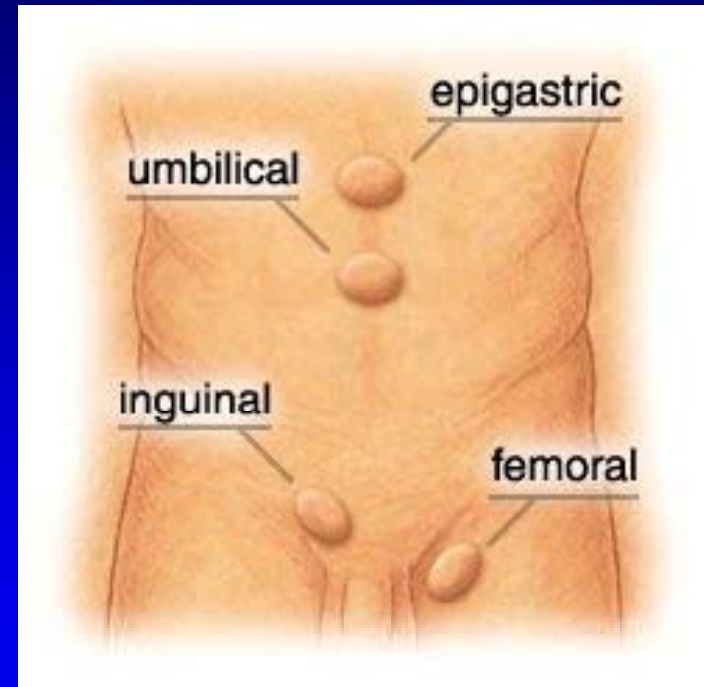
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## 2. ABDOMINAL HERNIAS



# TYPES

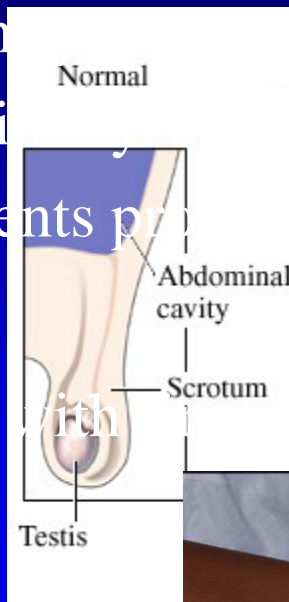
- Inguinal Hernia
  - Reducible
  - Incarcerated
- Hydrocele
  - Communicating
  - Hydrocele of cord
  - Non-communicating
- Umbilical Hernia
- Epigastric Hernia



# DEFINITIONS

## Inguinal Hernia

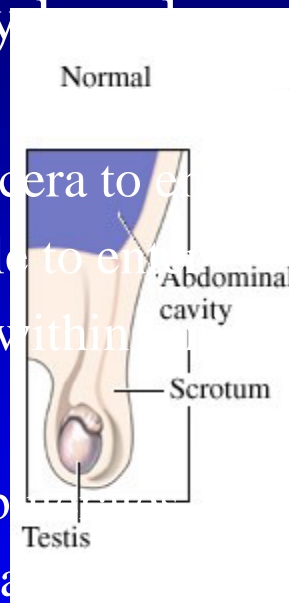
- Congenital patent processus vaginalis
- Remains in continuity with peritoneal cavity
- Abdominal contents protrude into processus vaginalis
- **Reducible**
  - Easily reducible with manual pressure
- **Incarcerated**
  - Unable to be reduced



# DEFINITIONS

## Hydrocele

- Communicating Hydrocele
  - Processus open
  - Too narrow for viscera to enter
  - Peritoneal fluid able to enter
  - Surrounds testicle within
- Hydrocele of cord
  - Distal processus ob
  - Fluid accumulates a
- Non-communicating
  - Proximal processus obliterates
  - Fluid trapped distally in tunica



# DEFINITIONS

## Umbilical Hernia

- Failure of umbilical ring to contract completely



## Epigastric Hernia

- Defect in decussating fibers of linea alba

# INGUINAL HERNIAS

## Embryology

- Processus vaginalis forms outpouching of peritoneum at 3 months gestation
- Passes through internal inguinal ring
- Migrates down inguinal canal into scrotum
- Precedes the testicle and lies within spermatic cord
- Processus obliterates around time of birth
- Except the distal portion which forms the tunica

# INGUINAL HERNIAS

## Incidence

- 3% of children overall
  - 50% during first year of life
- Increased risk in twins, preemies and hydrocephalus
  - 30% in premature infants
- Boys:Girls = 6:1
- Right:Left = 2:1
- 10% bilateral
- Increased risk of incarceration in <1 y.o.
  - 26% in < 4 month old

# HYDROCELES

## Incidence

- 10% of male infants born
- More common in prematurity
- May occur in older children, 2-5 y.o.
- Most resolve spontaneously within first year

# UMBILICAL HERNIAS

## Incidence

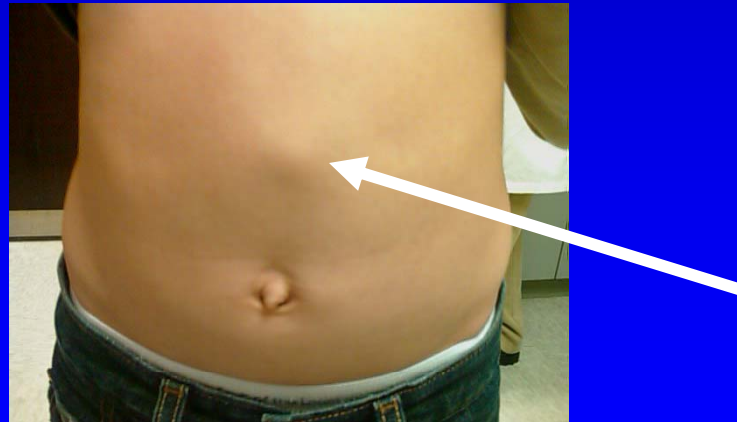
- Unknown, many resolve spontaneously
- 10x increased incidence in African American
- Increased incidence in prematurity
  - 75% infants < 1500g
- **Spontaneous Closure** by age 3-4 (95%)
  - Less likely in African American population
- Incarceration or strangulation= **RARE**



# EPIGASTRIC HERNIAS

## Incidence

- 5% of children
- Do not spontaneously resolve
- May have multiple defects
- Usually preperitoneal fat herniates through defect

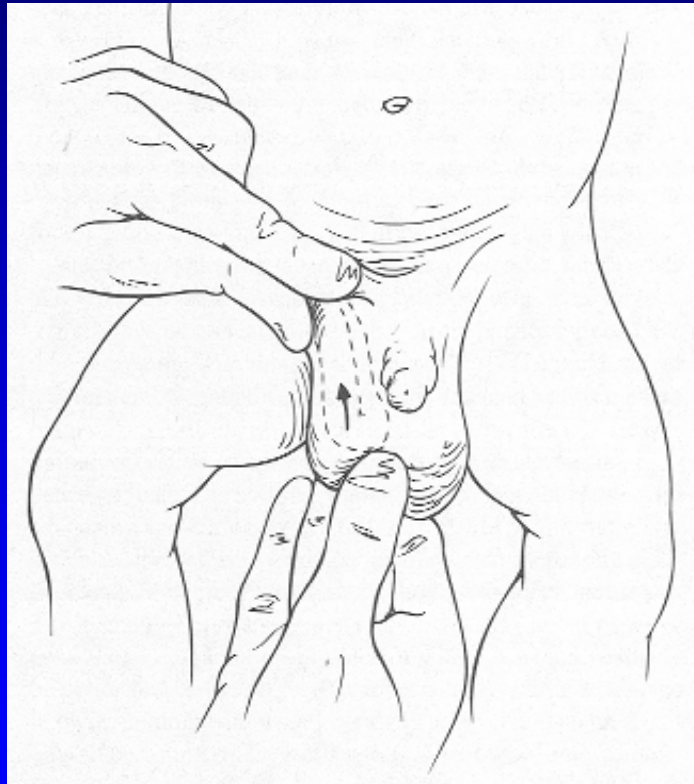
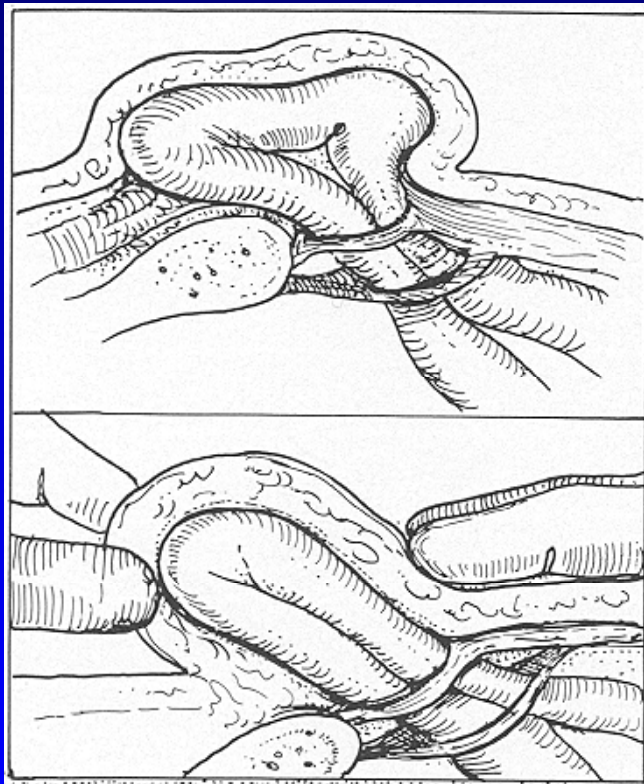


# SURGICAL INDICATIONS

- **INGUINAL**
  - Reducible: May be repaired electively
  - Incarcerated: Surgical emergency
- **HYDROCELE**
  - If present beyond 1 y.o. then elective repair
- **UMBILICAL**
  - If present beyond 4 y.o.
  - If large **fascial** defect (>1.5cm) then may repair at 2 y.o.
- **EPIGASTRIC**
  - Repair on elective basis

# SPECIAL TECHNIQUES

- Reduction of incarcerated hernia



# TOP 10

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## 3. HEAD AND NECK MASSES

# NECK MASSES IN CHILDREN

## MIDLINE

- Thyroglossal duct cyst
- Dermoid/Epidermoid cysts
- Lymphadenopathy
- Ectopic thyroid
- Thyroid masses

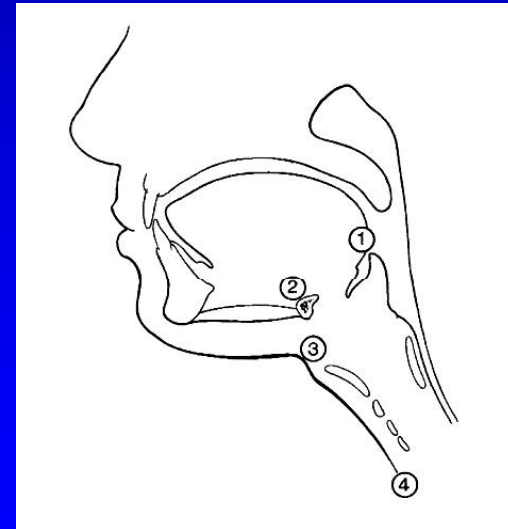
## LATERAL

- Branchial cleft cysts
- Cystic hygroma
- Lymphadenopathy
- Torticollis

# THYROGLOSSAL DUCT CYST

## Embryology

- Thyroid gland descends from base of tongue
- Thyroglossal duct descends from foramen cecum
- If thyroglossal duct, along line of descent, does not obliterate, cysts can develop



# THYROGLOSSAL DUCT CYST

## Presentation

- Most common lesion in midline of neck
- Appears between 2-10 years of age
- Rare in newborns
- Noted to be firm, round mass in midline
- Mass may rise with swallowing or sticking out tongue
- Cysts may become infected



# THYROGLOSSAL DUCT CYST

## Treatment

- Requires surgical excision
- Need to treat when not infected
- Sistrunk procedure
  - Dissection of cyst/sinus
  - Excise central portion of hyoid bone
  - Suture base of tract at floor of mouth





# DERMOID/EPIDERMOID CYSTS

## Embryology

- Ectodermal elements trapped beneath skin
- Ectodermal elements that failed to separate from neural tube
- Contain sebaceous material within cyst cavity
- Located more superficial

# DERMOID/EPIDERMOID CYSTS

## Presentation

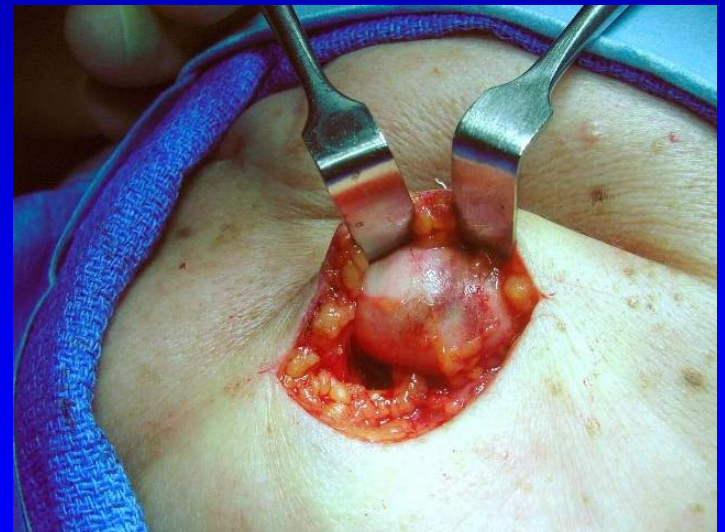
- Most common along supraorbital palpebral ridge
- Present as swelling in corner of eyebrow
- May appear at any age
- May present along midline



# DERMOID/EPIDERMOID CYSTS

## Treatment

- Requires surgical excision
- Need to treat when not infected
- Must excise entire capsule
- Hide incision within eyebrow

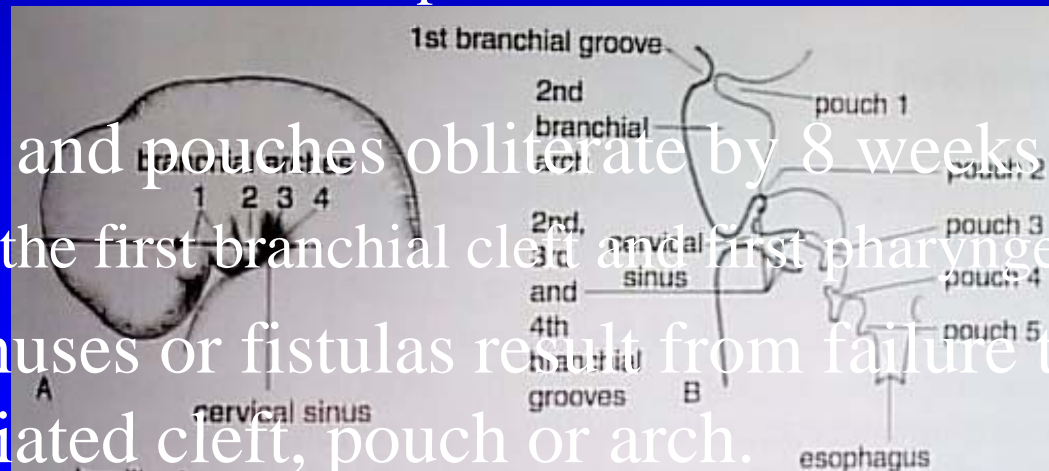


# BRANCHIAL CLEFT CYSTS

## Embryology

- At 4-8 weeks
  - 4 *Ectodermal* branchial clefts develop
  - Pharynx develops from 5 *Endodermal* pharyngeal pouches
  - Between each cleft and pouch is a *Mesodermal* branchial arch

- All clefts and pouches obliterate by 8 weeks
  - Except the first branchial cleft and first pharyngeal pouch
- Cysts, sinuses or fistulas result from failure to resorb the associated cleft, pouch or arch.

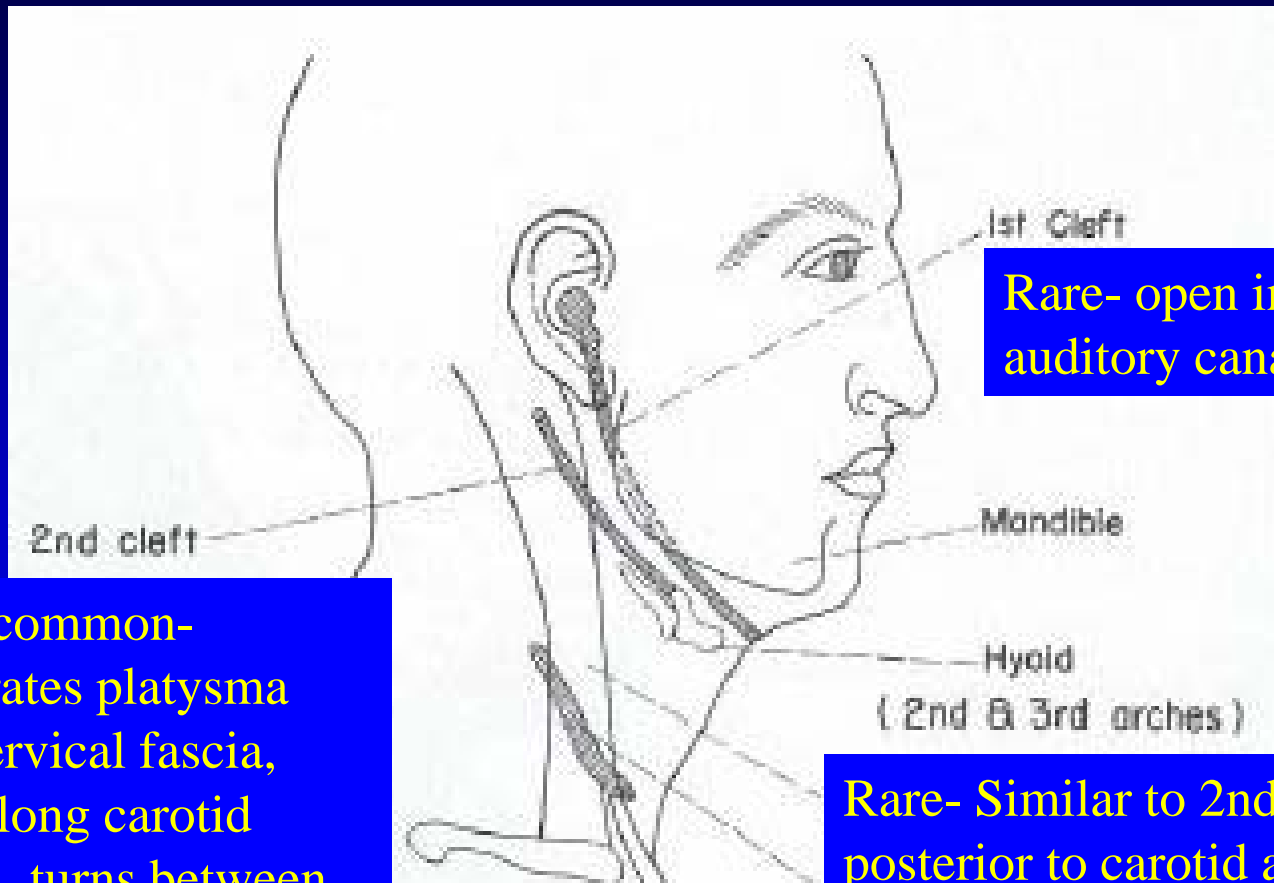


# BRANCHIAL CLEFT CYSTS

## Embryology

- 1<sup>st</sup> branchial cleft: forms tympanic cavity and eustachian tube
- 2<sup>nd</sup> branchial cleft: forms hyoid bone and cleft of tonsillar fossa
- 3<sup>rd</sup> branchial cleft: forms upper anterior portion of neck
- 4<sup>th</sup> branchial cleft: forms lower portion of neck

# BRANCHIAL CLEFT CYSTS



Rare- open into external auditory canal

Most common- penetrates platysma and cervical fascia, runs along carotid sheath, turns between

ca Rare- originate at apex of pyriform sinus and ascend anterior to carotid

Rare- Similar to 2nd, but ascend posterior to carotid artery, pierces thyrohyoid membrane and enters pyriform sinus

# BRANCHIAL CLEFT CYSTS

## Presentation

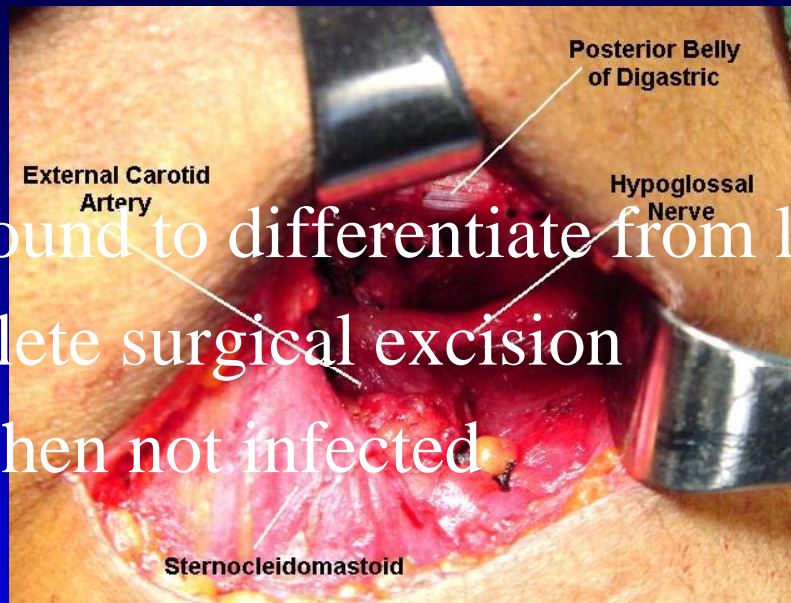
- Congenital defects, usually present at birth
- Cysts develop later
- Present as anterior or lateral neck mass
- May have mucoid drainage
- May present infected



# BRANCHIAL CLEFT CYSTS

## Treatment

- May use ultrasound to differentiate from lymph node
- Requires complete surgical excision
- Need to treat when not infected
- Careful on 1<sup>st</sup> cleft: facial nerve and auditory canal
- Careful on 2<sup>nd</sup> cleft: carotid bifurcation





# CYSTIC HYGROMA

## Embryology

- Congenital malformation of lymphatic system
- Results from obstruction between lymphatic and venous pathways
- Leads to lymph accumulation in sacs
- May be localized or diffuse
- Involves skin and soft tissues
- May be macro or microcystic
- Primarily located in cervical region, may involve axilla and chest

# CYSTIC HYGROMA

## Presentation

- Soft compressible mass in neck or axilla
- May have bluish hue
- May cause skin dimpling



# CYSTIC HYGROMA

## Treatment

- Surgical excision only means to “cure”
  - Recurrent infectious complications
  - Cosmetic
  - Gross deformity
- If macrocystic may be amenable to sclerotherapy
- Attempt to remove all cysts
- May be difficult due to involvement of major arteries, veins and nerves

# TOP 10

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## 4. ABDOMINAL PAIN

# ABDOMINAL PAIN

- A diagnostic challenge for all clinicians
- Need to differentiate surgical from benign pain
- Children have uniform response to infection
  - Fever, vomiting and abdominal pain
- Limited ability to express symptoms
  - The younger, the less likely to be textbook
- Not cooperative to examination
- Parental stress

# ABDOMINAL PAIN

## Pathophysiology

### 3 categories

- Visceral
  - Noxious stimuli affecting a viscus
  - Tension, stretching and ischemia stimulate fibers
  - Congestion and inflammation sensitize nerve fibers
  - Dull, poorly localized pain felt in midline

*American Family Physician, Volume 167, Number 11, Pages 2321-2326, June 1, 2003*

# ABDOMINAL PAIN

## Pathophysiology

### 3 categories

- Parietal
  - Noxious stimuli of parietal peritoneum
  - Ischemia, inflammation or stretching
  - Sharp, intense, localized pain
  - Movement can aggravate pain

*American Family Physician, Volume 167, Number 11, Pages 2321-2326, June 1, 2003*

# ABDOMINAL PAIN

## Pathophysiology

### 3 categories

- Referred
  - Noxious stimuli of various regions
  - Shared central pathways from different sites
  - Felt in same dermatome as diseased organ
    - Diaphragm to shoulder
    - Lungs to abdomen

*American Family Physician, Volume 167, Number 11, Pages 2321-2326, June 1, 2003*



# ABDOMINAL PAIN

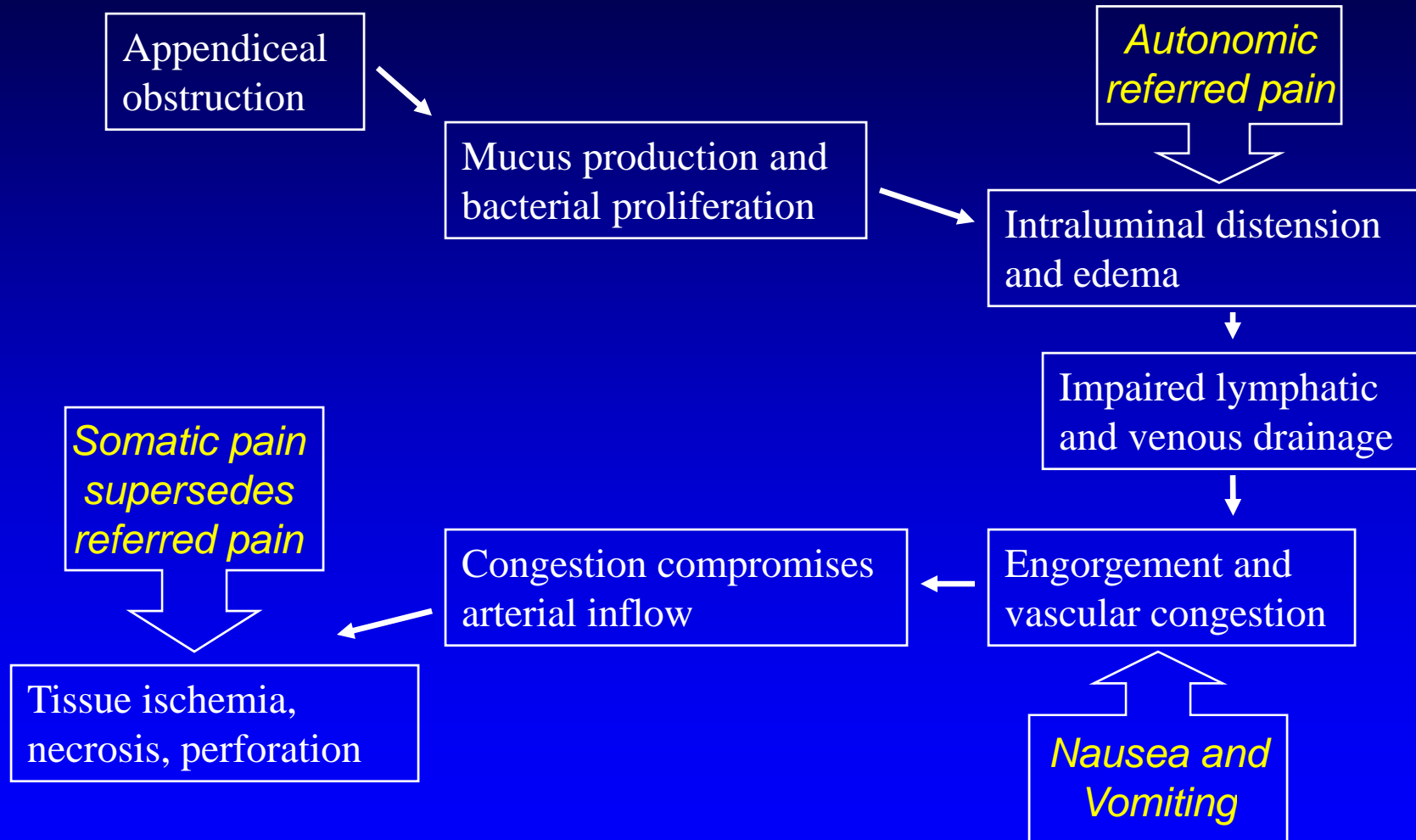
## Causes:

- Gastroenteritis
- Mesenteric lymphadenitis
- Constipation
- Appendicitis
- Trauma
- Food poisoning
- Lactose intolerance
- Dysmenorrhea
- Bowel obstruction
- Pneumonia
- UTI
- Inflammatory bowel disease
- Pharyngitis
- Meckel's
- Intussusception

# APPENDICITIS

- Most common surgical emergency in children
- 1/3 of hospitalizations for abdominal pain
- Lifetime risk
  - 8.7% boys
  - 6.7% girls
- Peak incidence between ages 12-18
- Most commonly ruptured in age < 5

# APPENDICITIS



# ABDOMINAL PAIN

## Presentation

- Abdominal pain
- Anorexia
- Nausea/vomiting
- Diarrhea
- Distended abdomen
- Lethargic

# ABDOMINAL PAIN

## Examination

- Pale, sleepy, fussy, curled up on bed
- Walking hunched over or won't walk
- Diffusely tender to mildly tender
- Flat abdomen or distended abdomen
- Periumbilical pain
- Right lower quadrant pain
- Guarding, rebound, peritonitis

# ABDOMINAL PAIN

## Laboratory

- CBC- normal to elevated WBC with shift
- Lytes- evidence of dehydration
- U/A- elevated ketones, bacteremia
- Amylase/lipase- normal
- CRP- normal to elevated (non-specific)

# ABDOMINAL PAIN

## Imaging

- Only if diagnosis questionable
  - Not required for an operation
- Plain abdominal film
  - Constipation
  - Paucity of air in RLQ
- US
  - May show free fluid
  - Inflammatory mass in RLQ
  - Best in thin children

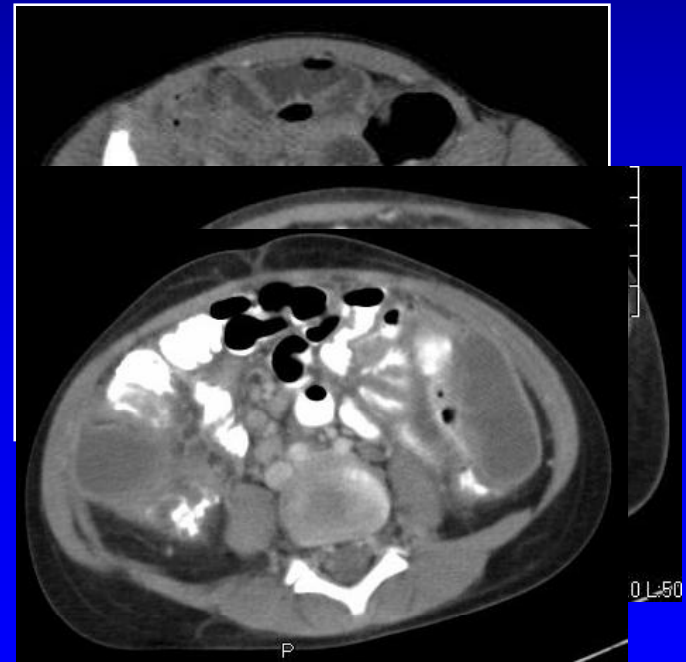


# ABDOMINAL PAIN

## Imaging

- CT

- Must have **oral and IV contrast** to be effective
- May show thickened appendix
- RLQ inflammatory mass
- Stranding, free fluid in RLQ
- Free fluid in pelvis
- Bowel obstruction
- Abscess in abdomen or pelvis





# ABDOMINAL PAIN

## UK Pediatric Surgery

- Imaging not required before transfer
  - Prefer no imaging- delays diagnosis and transfer
- Any child with >12 hour history of abdominal pain
- Exam or history suspicious for abdominal process
- Will determine need for imaging after examining

# ABDOMINAL PAIN

## Surgery

- Laparoscopic Appendectomy
  - Enter through umbilicus
  - 2 small incisions for instruments
  - New technique- Single incision
    - All done through umbilicus
- Open appendectomy
  - RLQ incision
  - Occasional midline incision



# TOP 10

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## 5. PYLORIC STENOSIS

# PYLORIC STENOSIS

## Pathophysiology

- Progressive hypertrophy of the muscularis
- Hypertrophy without hyperplasia
- Etiology unknown
  - Congenital redundancy of pyloric mucosa
  - Abnormalities of local enteric innervation
  - Diminished levels of nitric oxide synthase
- Exposure to erythromycin prenatally
- Eventually hypertrophy will resolve on own (months)

# PYLORIC STENOSIS

## Incidence

- Currently 1:150 live births
- Rare in African-American and Asian children
- Males 4x more than females
- Mild hereditary predisposition
  - 1 in 20 male offspring with affected male parent
  - 1 in 50 female offspring with affected male parent

# PYLORIC STENOSIS

## Presentation

- 2 weeks to 2 months of age
- Progressive non-bilious forceful emesis, “projectile”
- Emesis may be blood tinged
- Multiple formula changes have been made
- May have weight loss, failure to thrive
- May notice drop in number of wet diapers
- Unresponsive to reflux meds

# PYLORIC STENOSIS

## Diagnosis

- Abdomen scaphoid
- May or may not feel an “olive” in RUQ
- Hypochloremic, hypokalemic metabolic alkalosis
  - Chloride  $< 100$
  - Bicarbonate  $> 30$

# PYLORIC STENOSIS

## Diagnosis

- ULTRASONOGRAPHY- first line

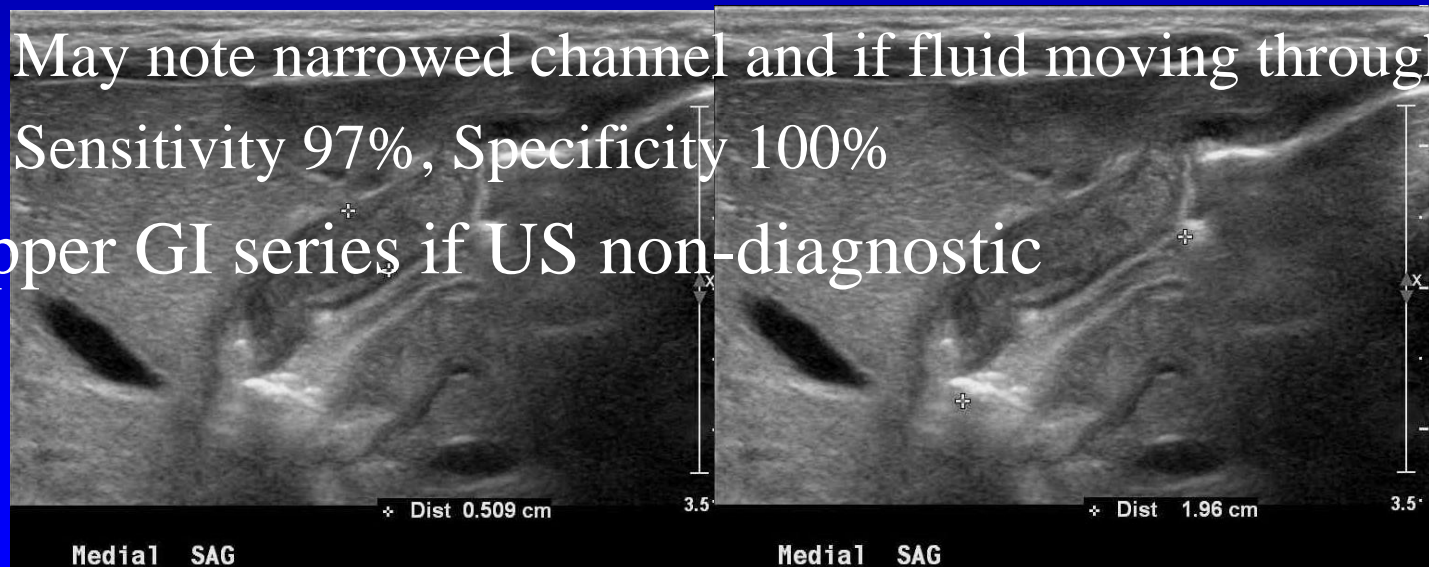
- Muscle thickness  $>3\text{mm}$

- Muscle length  $>15\text{mm}$

- May note narrowed channel and if fluid moving through

- Sensitivity 97%, Specificity 100%

- Upper GI series if US non-diagnostic





# PYLORIC STENOSIS

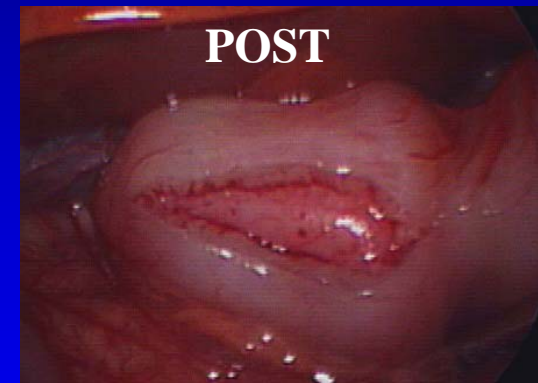
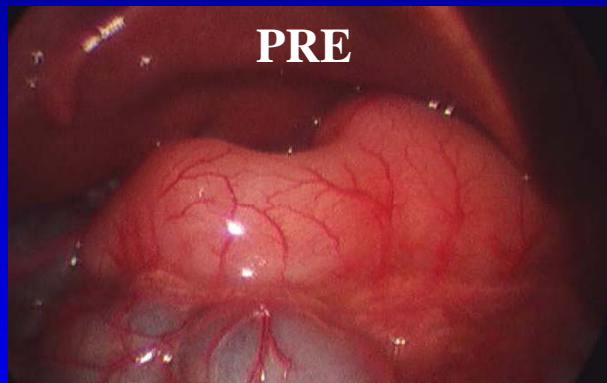
## Treatment

- HYDRATION
  - Bolus NS- 20 ml/kg (10 ml/kg not adequate)
  - May need to repeat 2-3 times
  - IVF D<sub>5</sub>1/2 NS at 1.5 maintenance (not D<sub>5</sub>1/4NS)
  - UOP 2 ml/kg/hr
  - Add K<sup>+</sup> after child making urine
  - If electrolytes abnormal, repeat in 6-12 hours

# PYLORIC STENOSIS

## Treatment

- SURGERY- When **ALKALOSIS** resolved
  - Laparoscopic Pyloromyotomy



- Open Pyloromyotomy
  - RUQ incision
  - Supraumbilical incision

# TOP 10

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## 6. UNDESCENDED TESTICLE

# UNDESCENDED TESTICLE

## Embryology

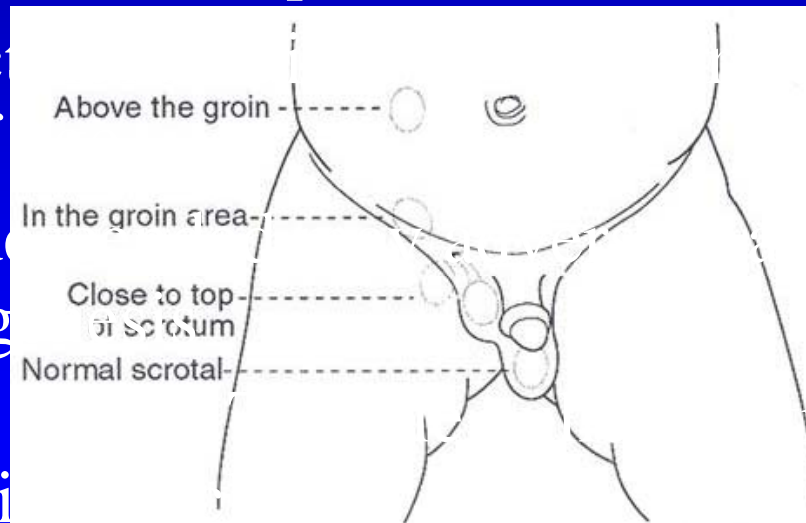
- Testis differentiates from gonadal ridge at 6-7 weeks
- By week 9, Leydig cells produce testosterone
- Testosterone stimulates wolffian structures
- In 3<sup>rd</sup> trimester, testis descends through inguinal canal
- Intraabdominal pressure and patent processus vaginalis required

# UNDESCENDED TESTICLE

## Pathophysiology

- Cryptorchidism= testis that has not descended into scrotum by 7-9 months of gestation
  - Term infants= 3%
  - Pre-term infants= up to 30%

- Ultrastructure of testis at 2 years of age
- If left undescended, spermatogenesis is affected
- Retractable testis is transiently by cremasteric reflex



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# UNDESCENDED TESTICLE

## Presentation

- Young male with empty scrotum, testicle may or may not be palpable outside scrotum
- If manipulated to base of scrotum without tension = retractile testicle
- May be mass palpable at inguinal crease
- If not palpable, may be located within abdomen
  - Need to examine suprapubic, perineal and upper inner thigh areas

# UNDESCENDED TESTICLE

## Treatment

- Descent after 1 year of age- unlikely
- Risk of developing cancer is 5-60x greater
  - Orchiopexy does NOT alter cancer risk
- If bilateral- trial of hcG stimulation
- Requires orchiopexy
  - If intra-abdominal- start with laparoscopy
  - May require 2-stage procedure- vessel clipping
  - If abnormal testicle or underdeveloped then orchiectomy

# TOP 10

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## 7. CIRCUMCISION



# CIRCUMCISION

## AMERICAN ACADEMY OF PEDIATRICS Task Force on Circumcision

### Circumcision Policy Statement

“ Existing scientific evidence demonstrates potential medical benefits of newborn male circumcision; however, these data are not sufficient to recommend routine neonatal circumcision...”

*PEDIATRICS, Volume 103, Number 3, Pages 686-693, March 1, 1999*

# CIRCUMCISION

## **AMERICAN ACADEMY OF PEDIATRICS Task Force on Circumcision**

### **Circumcision Policy Statement**

“...In circumstances in which there are potential benefits and risks, yet the procedure is not essential to the child's current well-being, parents should determine what is in the best interest of the child ...”

*PEDIATRICS, Volume 103, Number 3, Pages 686-693, March 1, 1999*

# CIRCUMCISION

## **AMERICAN ACADEMY OF PEDIATRICS Task Force on Circumcision**

### **Circumcision Policy Statement**

“...To make an informed choice, parents of all male infants should be given accurate and unbiased information and be provided the opportunity to discuss this decision. If a decision for circumcision is made, procedural analgesia should be provided.”

*PEDIATRICS, Volume 103, Number 3, Pages 686-693, March 1, 1999*

# CIRCUMCISION

## Embryology

- The glans penis derives from the genital tubercle at 4 to 6 weeks gestation
- The primitive urethral folds form the penile urethra
- The genital swellings become the scrotum
- The skin of the body of the penis begins growing forward at 8 weeks

*PEDIATRICS, Volume 103, Number 3, Pages 686-693, March 1, 1999*

# CIRCUMCISION

## Embryology

- The prepuce completely covers the glans
- A small opening remains at the urethral meatus
- The undersurface of the foreskin is fused with the glans at birth with congenital adhesions
- Not until later that foreskin is fully retractable
- Attempts at retraction should not be made until 2-3 years of age

# CIRCUMCISION

## Advantages

- Prevents Phimosis
- Prevents Paraphimosis
- Lowers UTI's in infancy
- Prevents balanoposthitis
- Lessens risk of developing cancer of the penis

# CIRCUMCISION

## Disadvantages

- Medically unnecessary in most boys
- Risk of painful complications

## Contraindications

- Anomalies of external genitalia
- Serious illness

# CIRCUMCISION

## Procedure

- 3 Types
  - “Freehand” circumcision
  - Gomco clamp
  - Plastibell device
- Steps
  - Estimation of the amount of external skin to be removed
  - Dilation of the preputial orifice
  - Freeing the inner preputial epithelium from the glans
  - Placing the device
  - Leaving the device long enough for hemostasis
  - Amputation of the foreskin.



# TOP 10

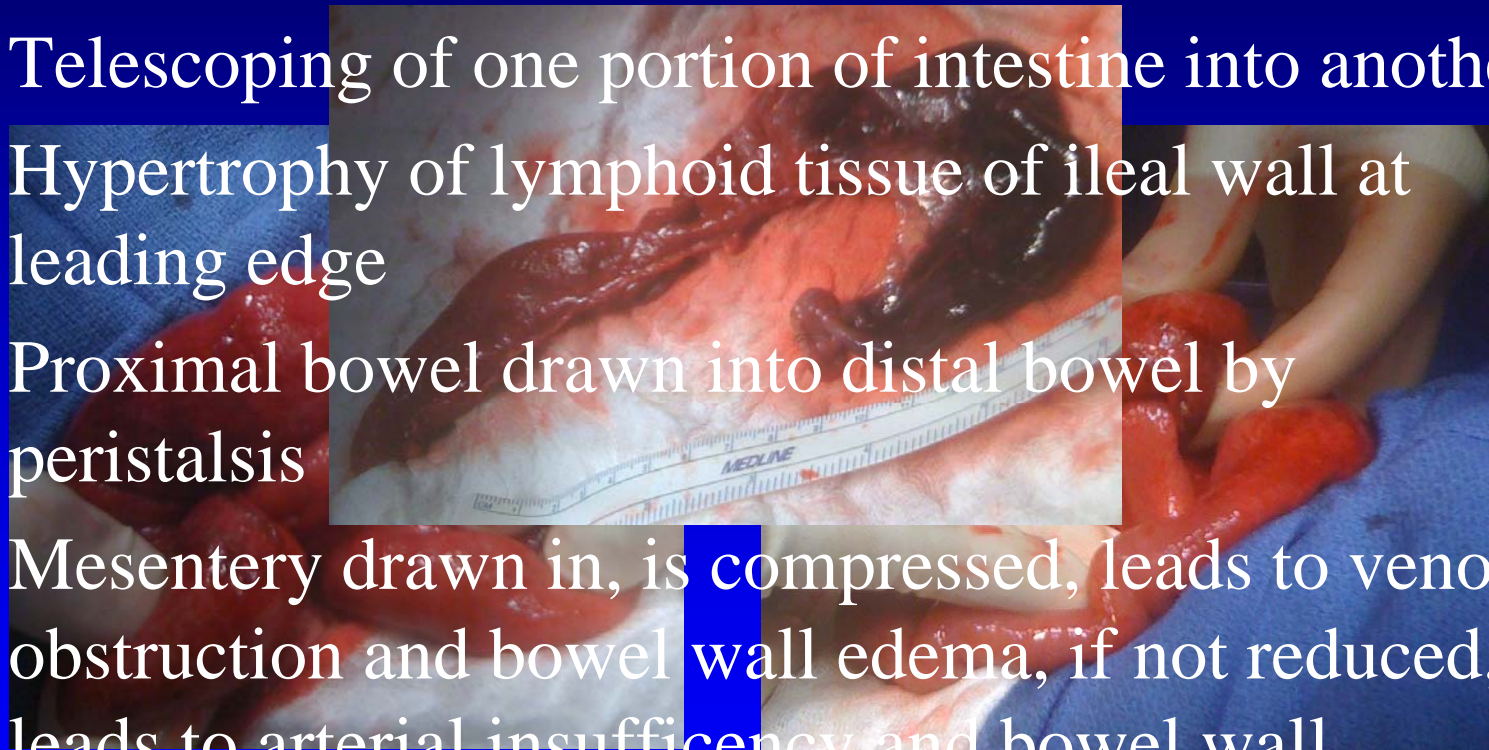
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## 8. INTUSSUSCEPTION

# INTUSSUSCEPTION

## Pathophysiology

- Telescoping of one portion of intestine into another
- Hypertrophy of lymphoid tissue of ileal wall at leading edge
- Proximal bowel drawn into distal bowel by peristalsis
- Mesentery drawn in, is compressed, leads to venous obstruction and bowel wall edema, if not reduced, leads to arterial insufficiency and bowel wall necrosis



# INTUSSUSCEPTION

## Pathophysiology

- More than 80% are ileocolic
- Rare types
  - ileoileal, cecocolic, colocolic and jejunojejunal
- Anatomic lead point in 2-12%
  - Increasing incidence with increase in age of child
  - Meckel's diverticulum most common
  - Appendix, polyps, carcinoid, submucosal hemorrhage, lymphoma, foreign body, ectopic pancreatic or gastric mucosa and intestinal duplication

# INTUSSUSCEPTION

## Incidence

- Greatest between 5-18 months of age
- 50% in first year of life
- 10-25% after 2 years of age
- 2/3 of cases in boys
- High suspicion
  - During peaks of respiratory infection
  - Epidemics of gastroenteritis

# INTUSSUSCEPTION

## Presentation

- Acute onset of cramping abdominal pain
- Uncomfortable child with legs pulled up to abdomen
- May be vomiting
- Dehydrated
- Attacks will be intermittent
- Child may appear well between attacks
- May have loose or small stools
- Late sign is “currant jelly” stools

# INTUSSUSUSCEPTION

## Diagnosis

- Plain Abdominal film
  - Paucity of air in RLQ



right



normal



longitudinal



transverse

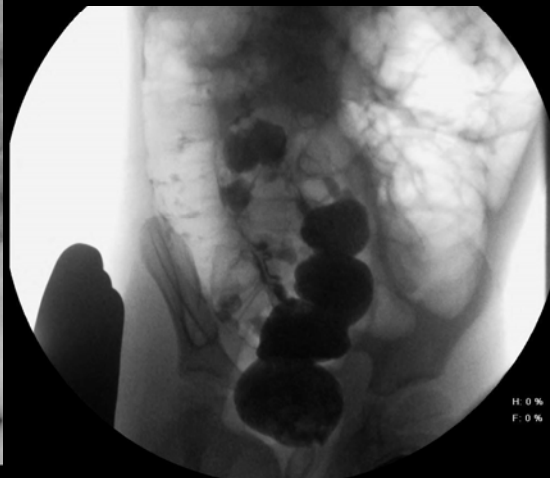
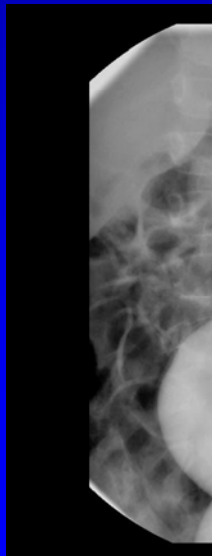
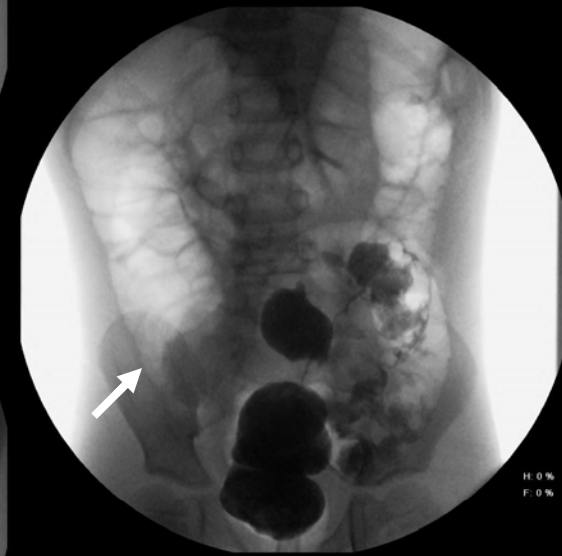
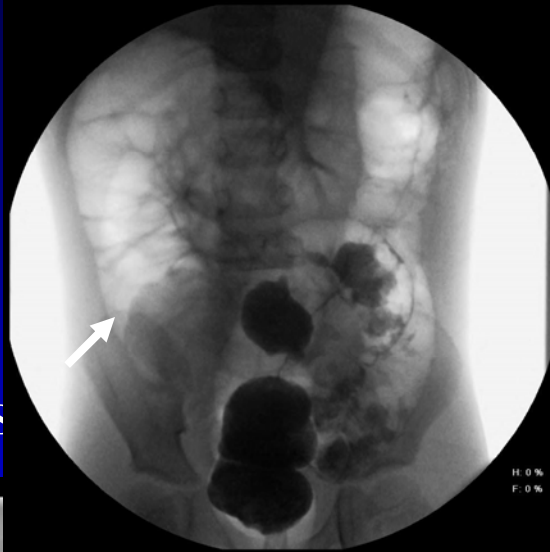


upine

# INTUSSUSUSCEPTION

## Treatment

- Enema
  - Air
  - Contrast



# INTUSSUSCEPTION

## Treatment

- Surgery
  - Attempt to reduce manually
  - Bowel resection





# TOP 10

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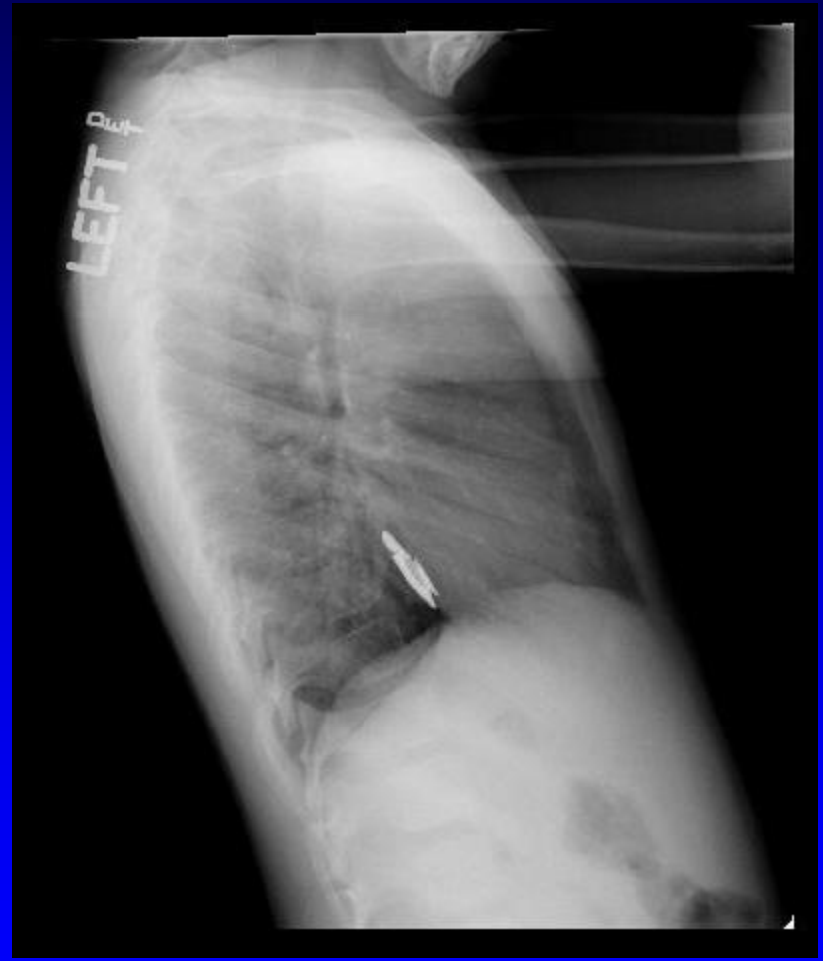
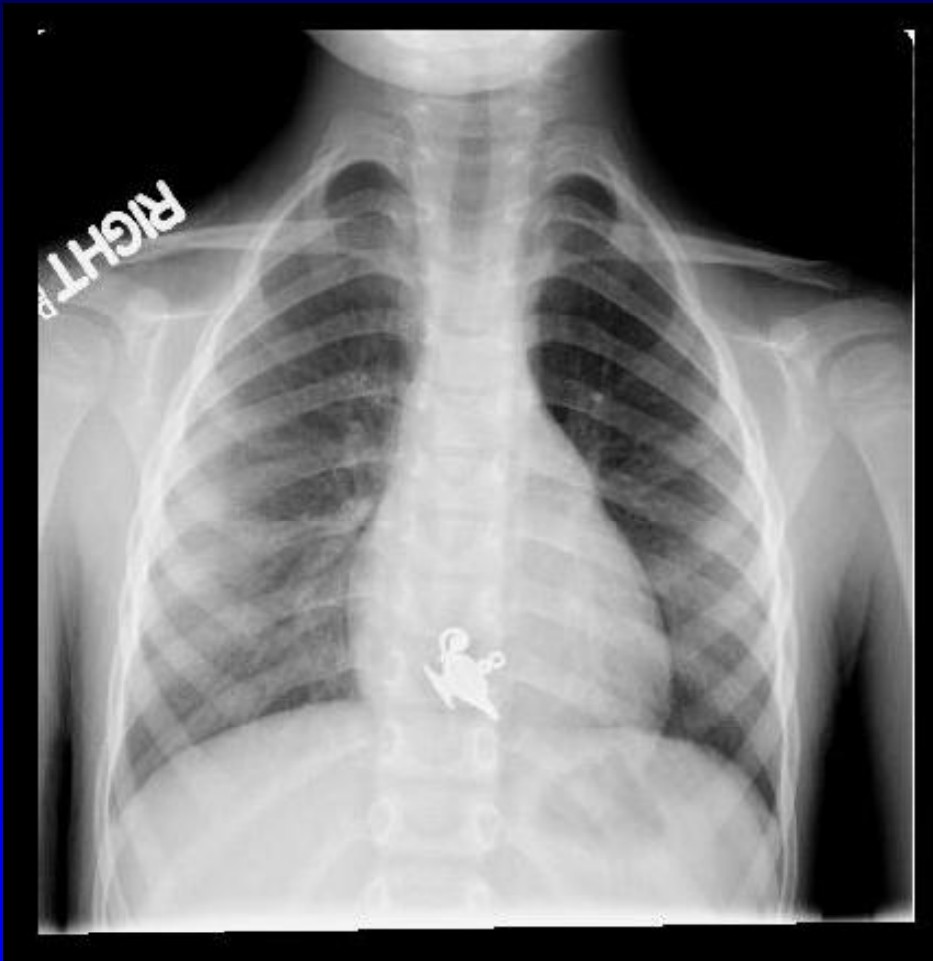
## 9. FOREIGN BODIES

# FOREIGN BODIES

## Esophagus

- Narrowest portion of the GI tract
  - Most foreign bodies will get trapped here
- Upper end protected by Cricopharyngeus muscle
- Narrowed at aortic arch, left mainstem bronchus and diaphragm
- Most objects that pass the cricopharyngeus, will pass into the stomach
- May be secondary to congenital malformation or previous surgical intervention

# FOREIGN BODIES



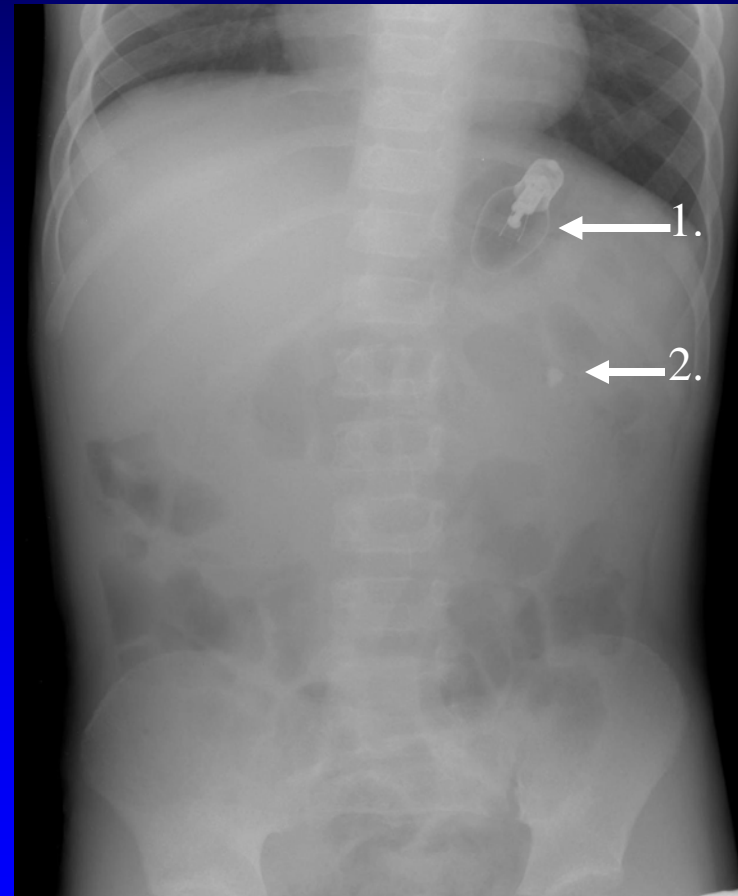
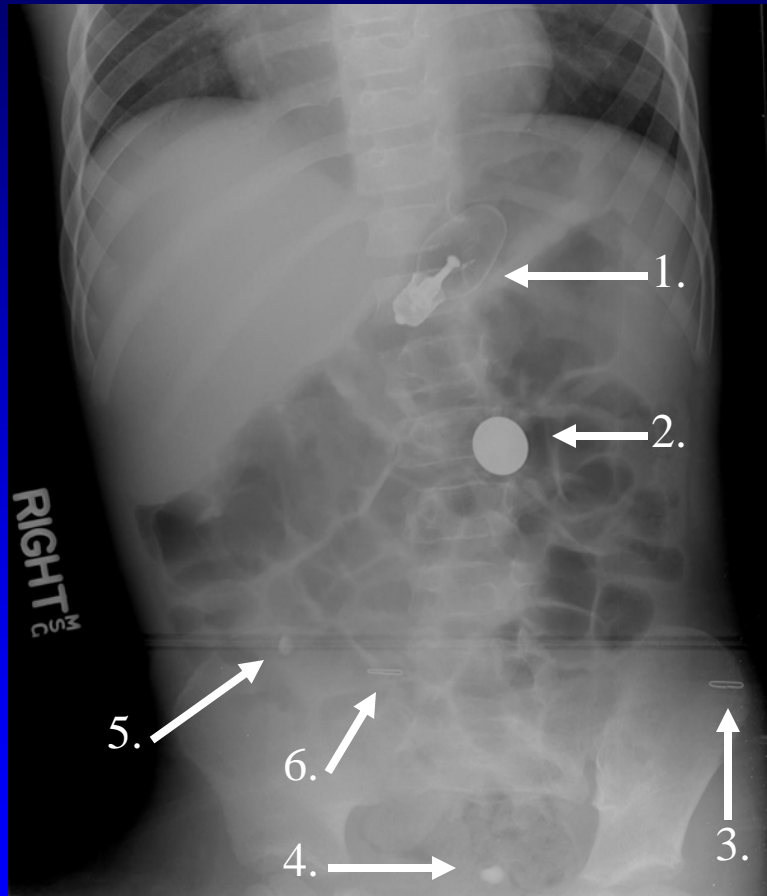
# FOREIGN BODIES

## Presentation

- Incidence
  - Cricopharyngeus 63-84 %
  - Aortic Crossover 10-17 %
  - Lower esophageal sphincter 5-20 %
- Coins and smooth blunt objects most common (89%)
- 18-48 month old most common
- Often unrecognized ingestion
- Coughing, gagging, excessive drooling

# FOREIGN BODIES

## HOW MANY OBJECTS???



# FOREIGN BODIES

## Diagnosis

- PA and lateral chest
- PA and lateral abdomen films
- If not radiopaque- Need UGI
- Endoscopy

# FOREIGN BODIES

## Treatment

- Upper esophagus- Rigid or flexible esophagoscopy
- Middle esophagus- Rigid or flexible esophagoscopy
- GE Junction- Pass NGT and push into stomach
- Stomach- Leave alone, will pass on own
- Obstructive symptoms- require removal
  
- Batteries- Small watch batteries may burn mucosa

# FOREIGN BODIES



Push pin for Boutonnière

- Not found on Endoscopy
- Patient passed spontaneously



# TOP 10

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## 10. TRAUMA

# TRAUMA

- Most Common cause of death/disability in children

- More than 1 million injuries in US

- More than 1 million serious injuries in US

- Most serious injuries in US



injuries in US

in serious

in US

*Advanced Trauma Life Support for Doctors, ATLS Student Course Manual, 8<sup>th</sup> edition. American College of Surgeons Committee on Trauma*

# TRAUMA

- Unsuccessful resuscitation in severe pediatric trauma greatest risk to survival
  - Failure to secure airway
  - Failure to support breathing
  - Failure to recognize intraabdominal hemorrhage
  - Failure to recognize intracranial hemorrhage
- Knowing and instituting ATLS principles to care of injured children can impact survival

*Advanced Trauma Life Support for Doctors, ATLS Student Course Manual, 8<sup>th</sup> edition. American College of Surgeons Committee on Trauma*

# TRAUMA

## ATLS

- Primary Survey

- A- Airway maintenance
- B- Breathing and ventilation
- C- Circulation with hemorrhage control
- D- Disability: Neurological
- E- Exposure/Environment  
undress patient but protect



- Secondary Survey

- Head to toe examination for other injuries

*Advanced Trauma Life Support for Doctors, ATLS Student Course Manual, 8<sup>th</sup> edition. American College of Surgeons Committee on Trauma*

# TRAUMA

## ATLS

- Goal is to stabilize patient first
- Do not move on to next sequence until first one completed
- Airway most important in children
  - Inability to establish or maintain a patent airway with lack of oxygen and ventilation is most common cause of cardiac arrest in children

*Advanced Trauma Life Support for Doctors, ATLS Student Course Manual, 8<sup>th</sup> edition. American College of Surgeons Committee on Trauma*

# TRAUMA

## AIRWAY

- Narrow, short and anterior in children
- Use bag valve mask or intubate

## BREATHING

- RR differ by age
  - Newborn 60
  - Infant 40
  - Preschool 30
  - Adolescent 20 (adult)
- Chest wall compliant “bounce”



# TRAUMA

## CIRCULATION

- Adequate IV access- 2 large bore
- May use hand, arm, legs, scalp, IO, central line
- Adequate bolus
  1. 20 ml/kg LR
  2. 20 ml/kg LR
  3. 10 ml/kg PRBC
- Control bleeding with direct pressure

# TRAUMA

## DISABILITY

- GCS (Motor-6, Verbal-5, Eyes-4)

## EXPOSURE/ENVIRONMENTAL CONTROL

- Visualize all wounds while keeping patient warm
- Infants/toddlers have poor temp regulation
  - Increase room temp prior to arrival
  - Warm all fluids or use fluid warmer
  - Warm blankets (Bair hugger from OR)
  - Remove all wet clothing/blankets/boards



# TRAUMA

## Management

- Complete secondary survey
- Obtain plain films- C-spine, CXR, Pelvis
- Decide if other more specific imaging needed
  
- If you do not have capability or unable to take care of injured child, **DO NOT IMAGE** and immediate call for transfer to trauma center

# TRAUMA

## Imaging

- C-spine- PA, lateral and odontoid views
- CXR- look for pneumo, mediastinum, fractures, contusion
- Pelvis- fractures, widening
- CT scan- ONLY if able to treat (NO oral contrast)
  - Solid organs
  - Free fluid
  - Hernias
  - Fractures

# TRAUMA

## Types of Injuries- Age Relationship

### Blunt Injuries

- Infant- Shaken baby, improper car seat, drops
- Toddler- Falls, ingestion, burns, passengers
- Preschool- Pedestrian, “KY air bag”, bikes start, passengers
- Elementary- Self propelled vehicles, falls, pedestrian, passengers and operators
- Middle school- Bigger toys but similar pattern
- High school- See adult patterns of injury and physiology (self stupidity)

# TRAUMA

- Blunt trauma most common in children
  - MVA
  - Bicycles
  - Sports
  - Pedestrians
  - Falls
  - Abuse
- Solid organ injury most common
  - Spleen and liver roughly equal
- Associated injuries
  - Head injury
  - Thoracic (pulmonary contusion)
  - Extremity injury



# PEDIATRIC TRAUMA AT UK

LEVEL 1 ACS Accredited Trauma Center  
2009-2012

- Pediatric Trauma Nurse Coordinator  
Bari-Lee Mattingly  
Beeper 330-4095
- Pediatric Emergency Medicine Director  
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