Pediatric surgical problems you don’t want to miss: Case-based surgical problems seen in the primary care setting

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Conflict of Interest Disclosure

Daniel P. Doody, M.D.

I have no financial interest or relationship with a manufacturer of a commercial product, service, technology, or program to be discussed in my presentation.

Primary Care Pediatrics

Harvard Medical School

December 6, 2024

Learning Objectives

- Recognize the presentation of potentially critical surgical conditions
- Identify key components of the history and exam
- Know the initial workup and management
- Recognize when urgent referral is necessary, and when it is not

Case-based surgical problems seen in the primary care setting

14-year-old male with lower abdominal pain

- Presents with parents for an urgent visit
- Some pain last night but worsened over the night making it difficult to sleep. The pain is constant, and he reports that it is 7/10 on pain scale.
- Nauseous and vomited once
- Said he may have had pain like this last year but resolved after a short period of time.

14-year-old male with lower abdominal pain

- His chest and abdominal examination are largely unremarkable. Breath sounds are clear. Abdomen is scaphoid with active bowel sounds and without tenderness to palpation.
- You consider sending him for labs but are a little uncertain which labs would be most informative.
- You ask if things are okay at school and home.
- You ask if he has had any recent falls or injuries.
- The 14-year-old asks his parents to leave so he can discuss some things with you.

Acute testicular pain in adolescent

What is your differential?

- Epididymitis / Orchitis
  - Infectious
  - Inflammatory
- Torsion of testis
- Torsion of appendiceal remnant
- Trauma – rupture or hematoma
- Incarcerated inguinal hernia
- Tumor
- Varicocele
- Abdominal process
- Nephroureterolithiasis

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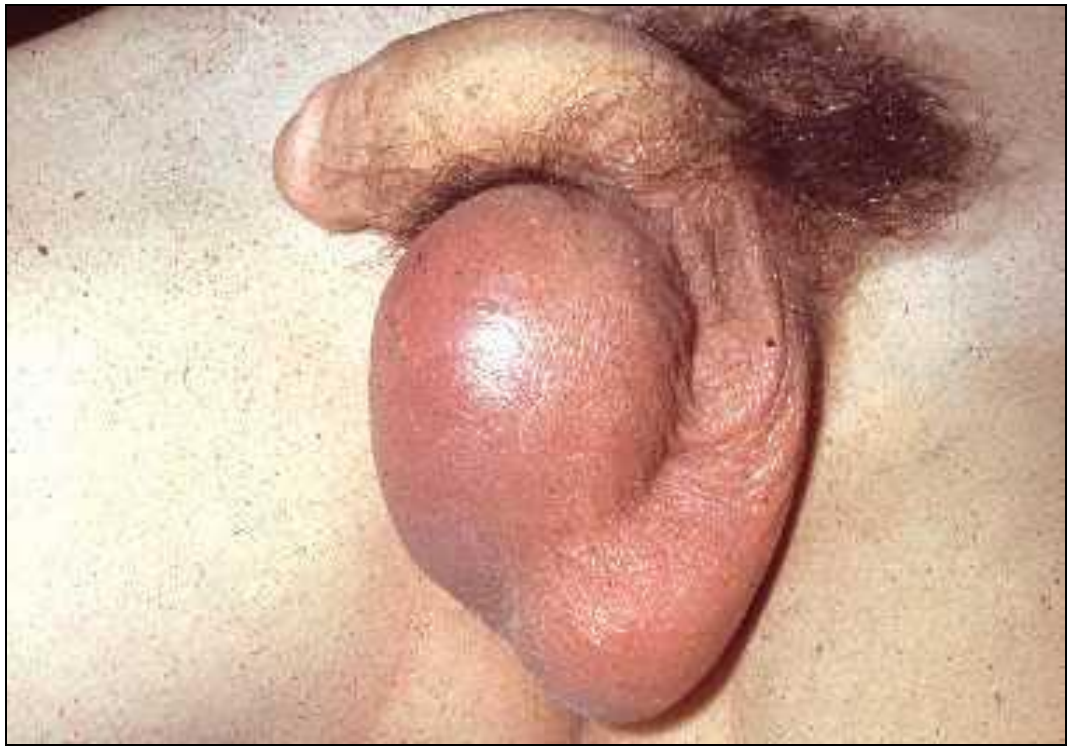
Abdominal pain can be testicular in origin

- Exam:
  - Testicle elevated
  - Erythematous
  - Edematous
    - Loss of rugal folds
  - Very tender
  - Absent cremasteric reflex
- *BUT* the appearance may appear close to normal



Acute testicular pain in adolescent
What tests will you order?

- Urinalysis
- CBC with differential
- Color Doppler ultrasound

If exam suspicious for torsion, the child needs immediate surgical evaluation

Case-based surgical problems seen in the primary care setting

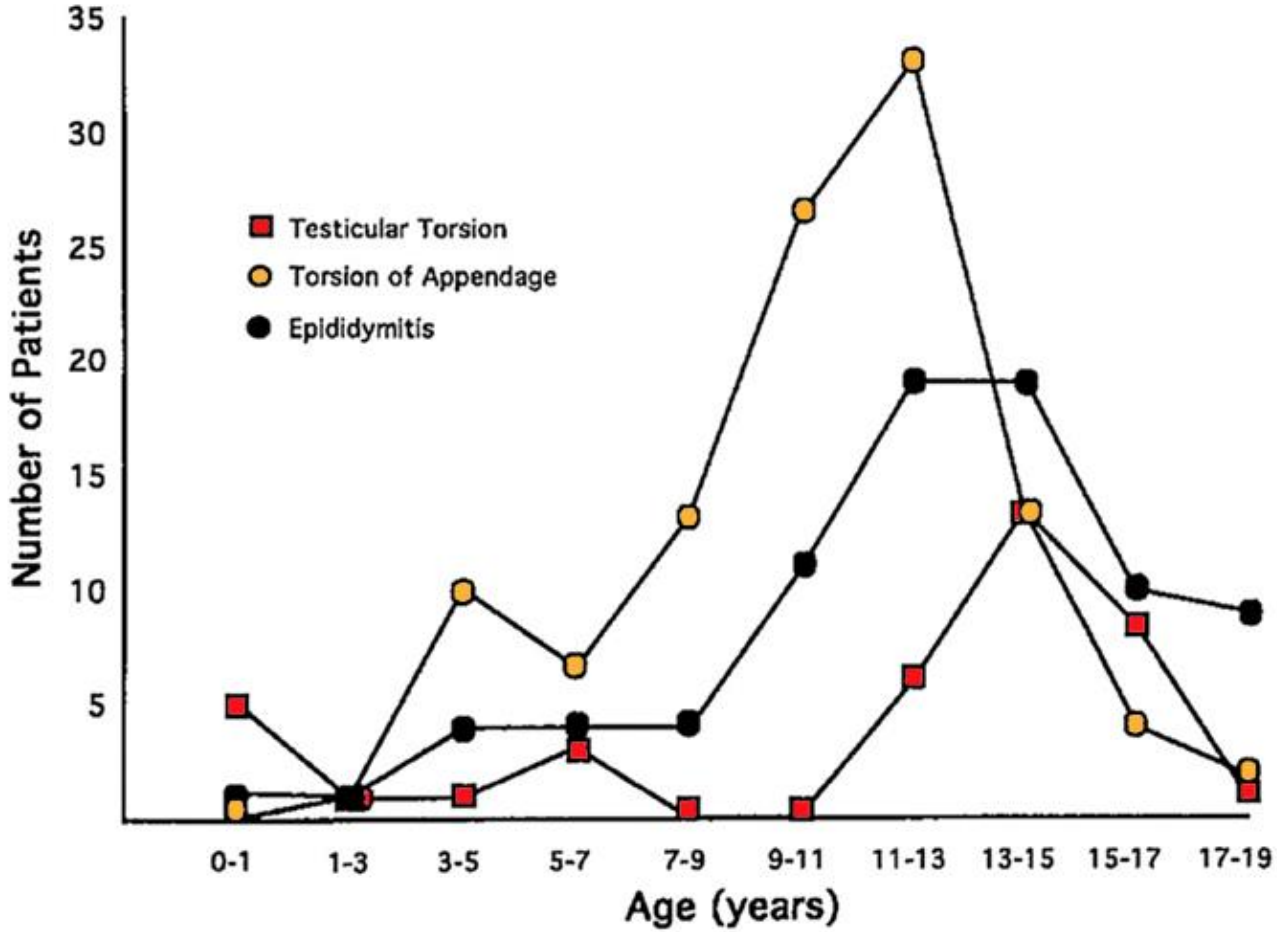


Fig. 2. Relative incidence of torsion, appendage torsion, and epididymitis as a function of age.

Davis JE, Silverman M. Scrotal emergencies. Emerg Med Clin North Am 29:469-84, 2011

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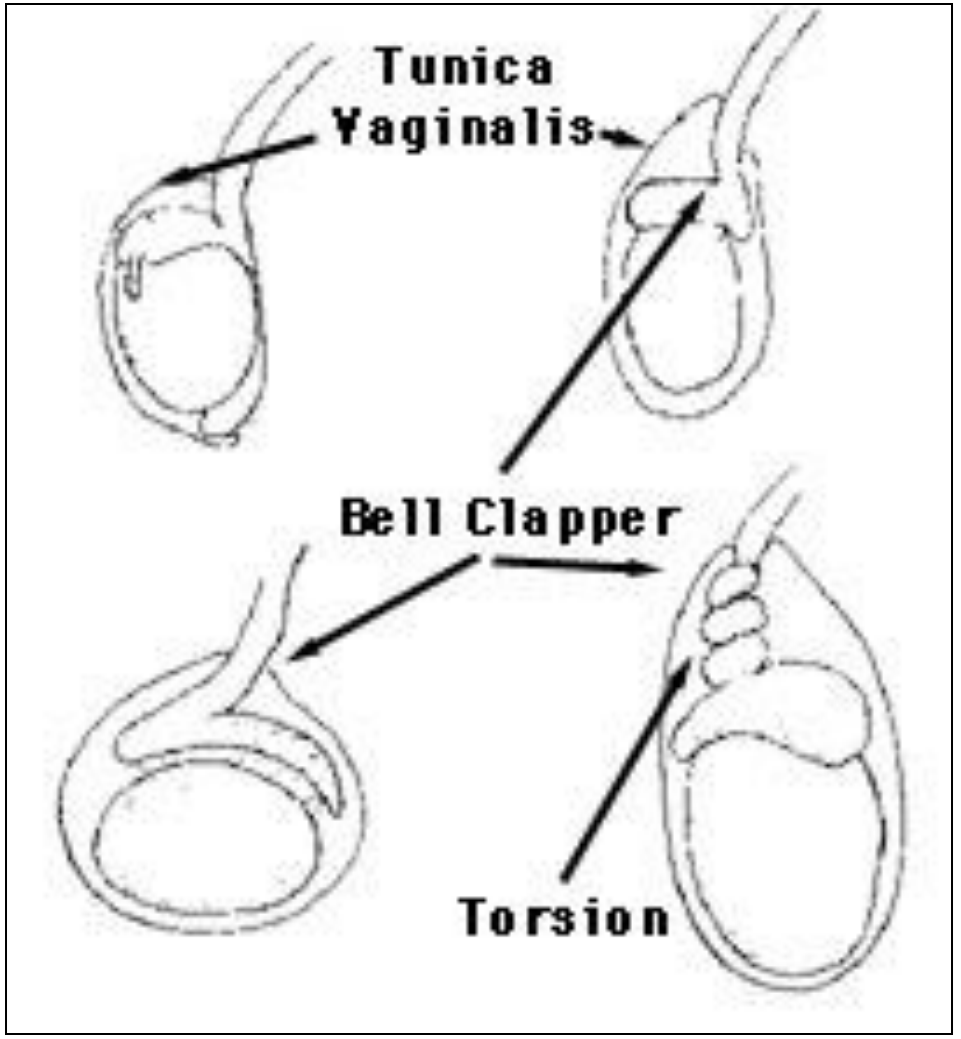
Testicular torsion

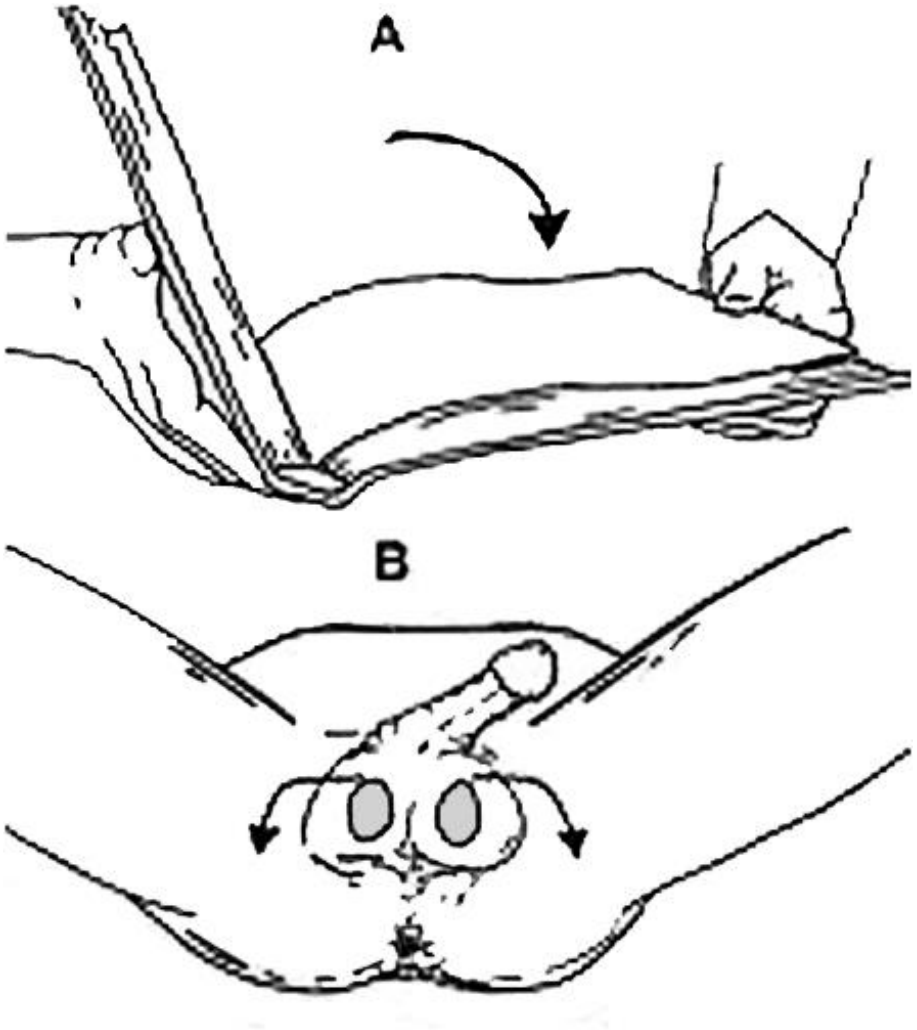
- Classically bimodal
  - ✓ Adolescent boys aged 12-18 years
  - ✓ Newborn period
  - ✓ *BUT* can occur at any age
- In an adolescent, sudden testicular pain, vomiting, lower abdominal pain, and occasionally history of similar episodes
- Hemiscrotum exquisitely tender, often red
- Bell-clapper deformity
- Newborn torsion usually discrepancy in size and color on exam of scrotum with firm, often nontender, enlarged testicle

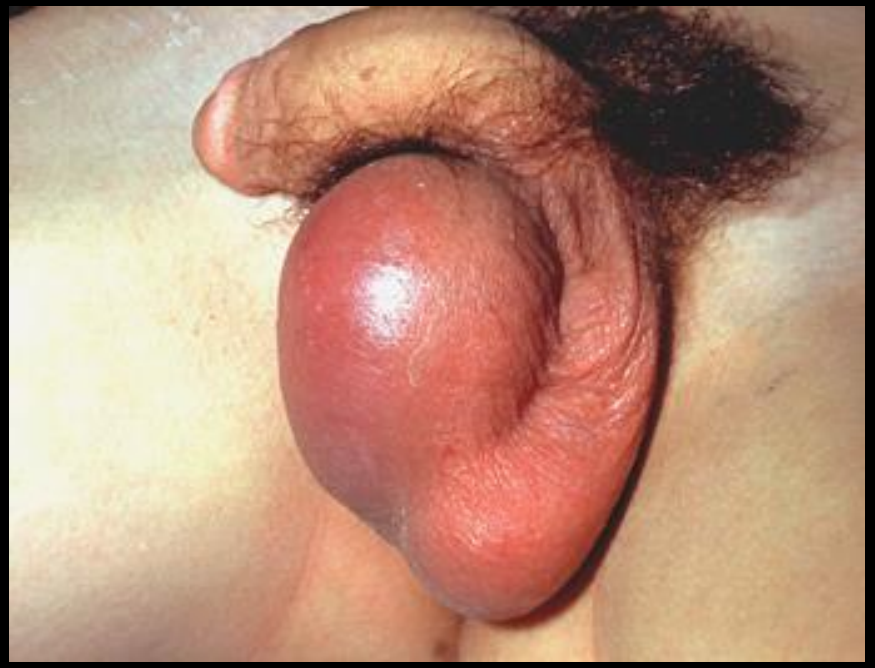


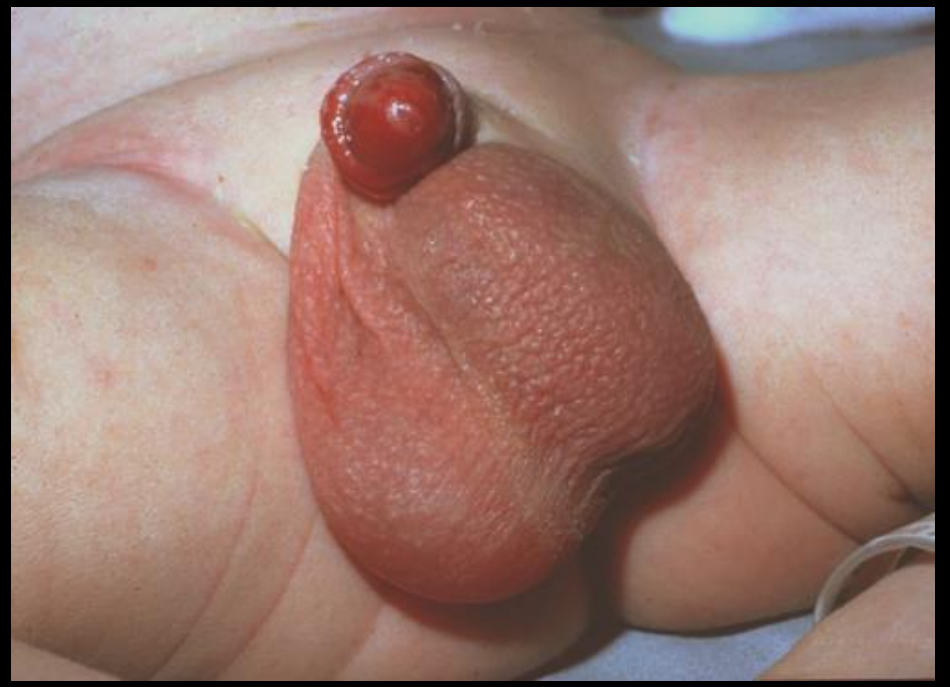
What can you do?

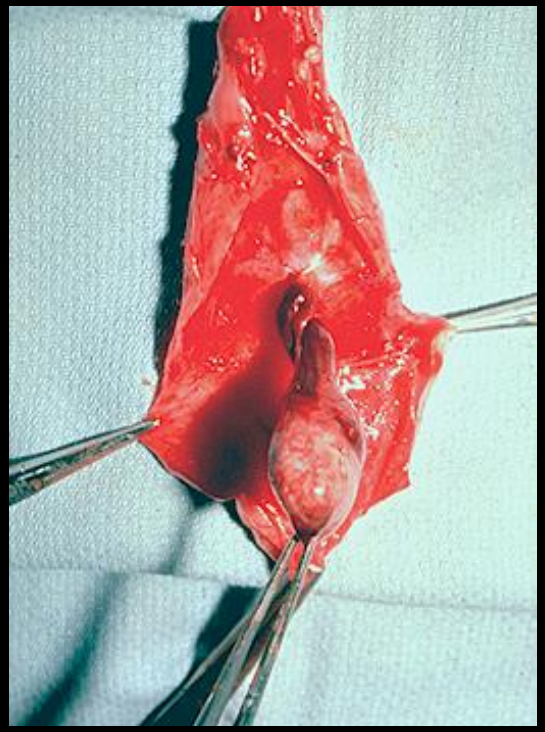
Manual Detorsion -*"Opening a book"*

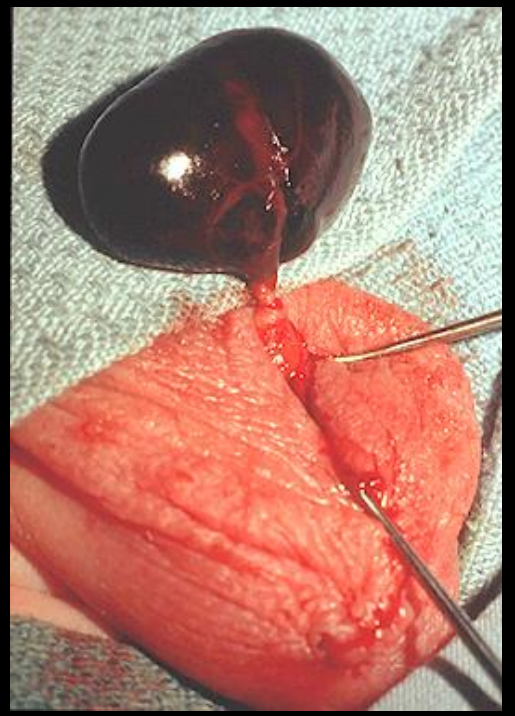
- Doesn't always work and one should also consider turning the other way
- Pain relief is almost instantaneous











Case-based surgical problems seen in the primary care setting

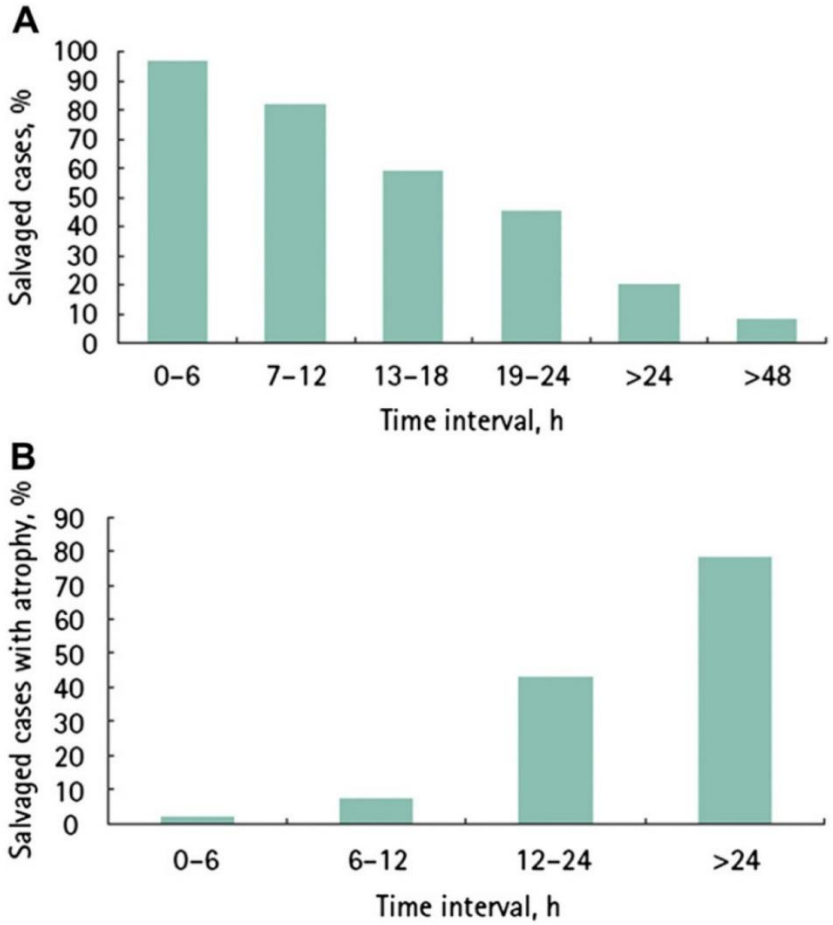


Fig. 4. Testicular salvage and atrophy rates over time in testicular torsion. (*A*) Immediate (early) surgical salvage after torsion. (*B*) Subsequent atrophy of surgically salvaged testes after torsion of various time intervals.

Davis JE, Silverman M. Scrotal emergencies. *Emerg Med Clin North Am* 29:469-84, 2011

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Learning Points

- Adolescent males may be reluctant to discuss genital pain
- The earlier the recognition, the greater chance of salvage
- Important to stress to family the urgency of evaluation
- Appropriate to notify Emergency Room or surgeon about your concerns

Case-based surgical problems seen in the primary care setting

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Sudden worsening of GI illness in 16-month-old toddler

- Previously healthy 16-month-old female has had diarrheal illness for the past few days. Two older siblings with similar symptoms earlier in the week.
- Vomited today after attempt at feeding; initially “milk and stomach contents”, now “yellowish”
- Irritable, maybe colicky

Your very experienced nurse practitioner ran it by you and told the Mom that it sounds “like gastro” and try some Pedialyte. She added to call back if the toddler wasn’t better.

…but she adds that family well known to practice called this morning

- 3-week-old male
- Third child
- Full-term, otherwise healthy
- Mother calls to report multiple episodes of vomiting
- “He doesn’t seem right.”

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Important questions

Are other family members sick?

Is he a 'wet baby'?

Is he still eating?

Breast feeding or formula feeding?

- ***If breast feeding, any changes in your own diet?***
- ***If formula, any recent changes in formula?***

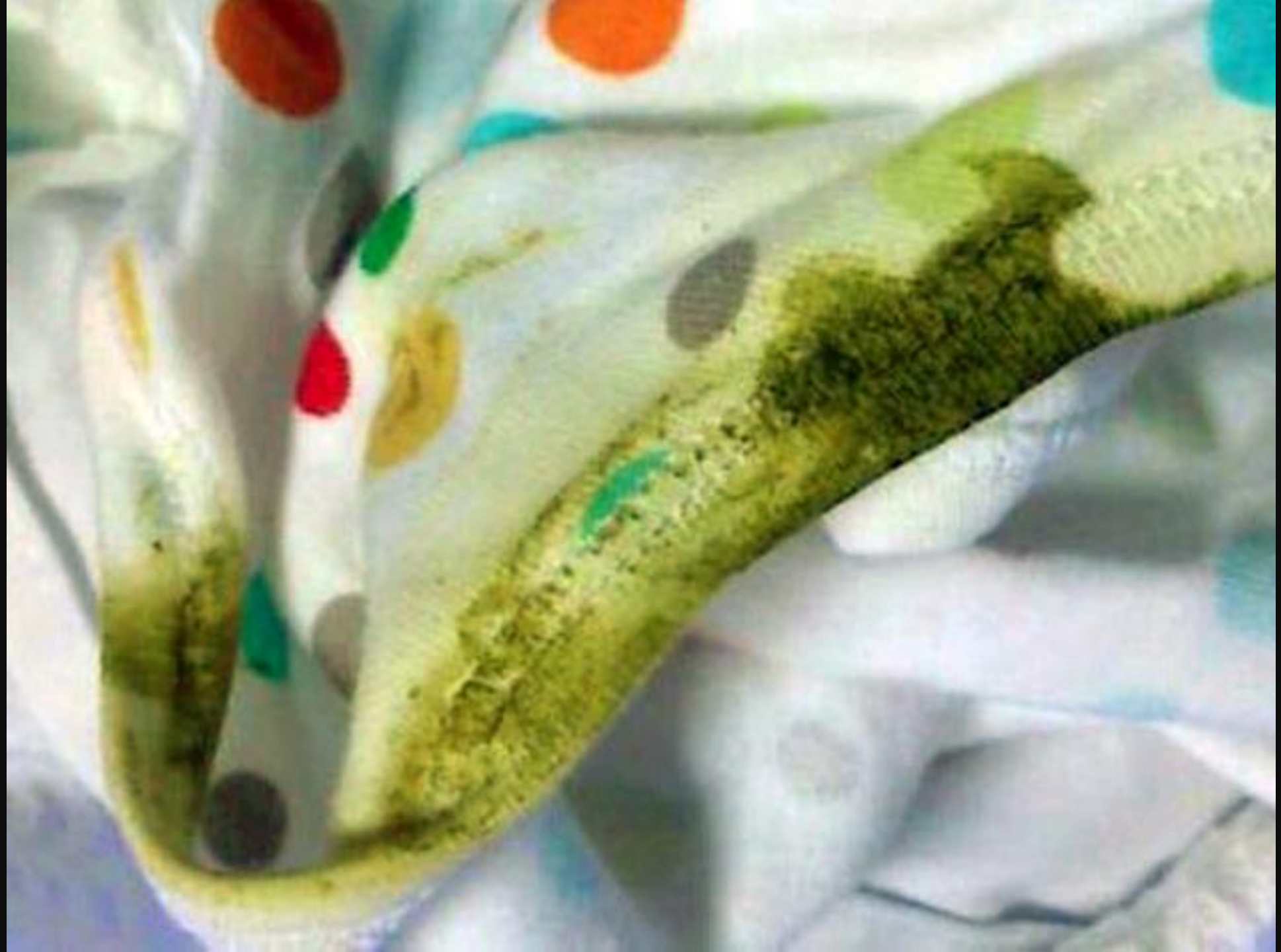
Did he pass meconium in the first 24 hours?

But the most important

What is the color of the emesis?

Exam:

Infant looks well although slightly irritable.



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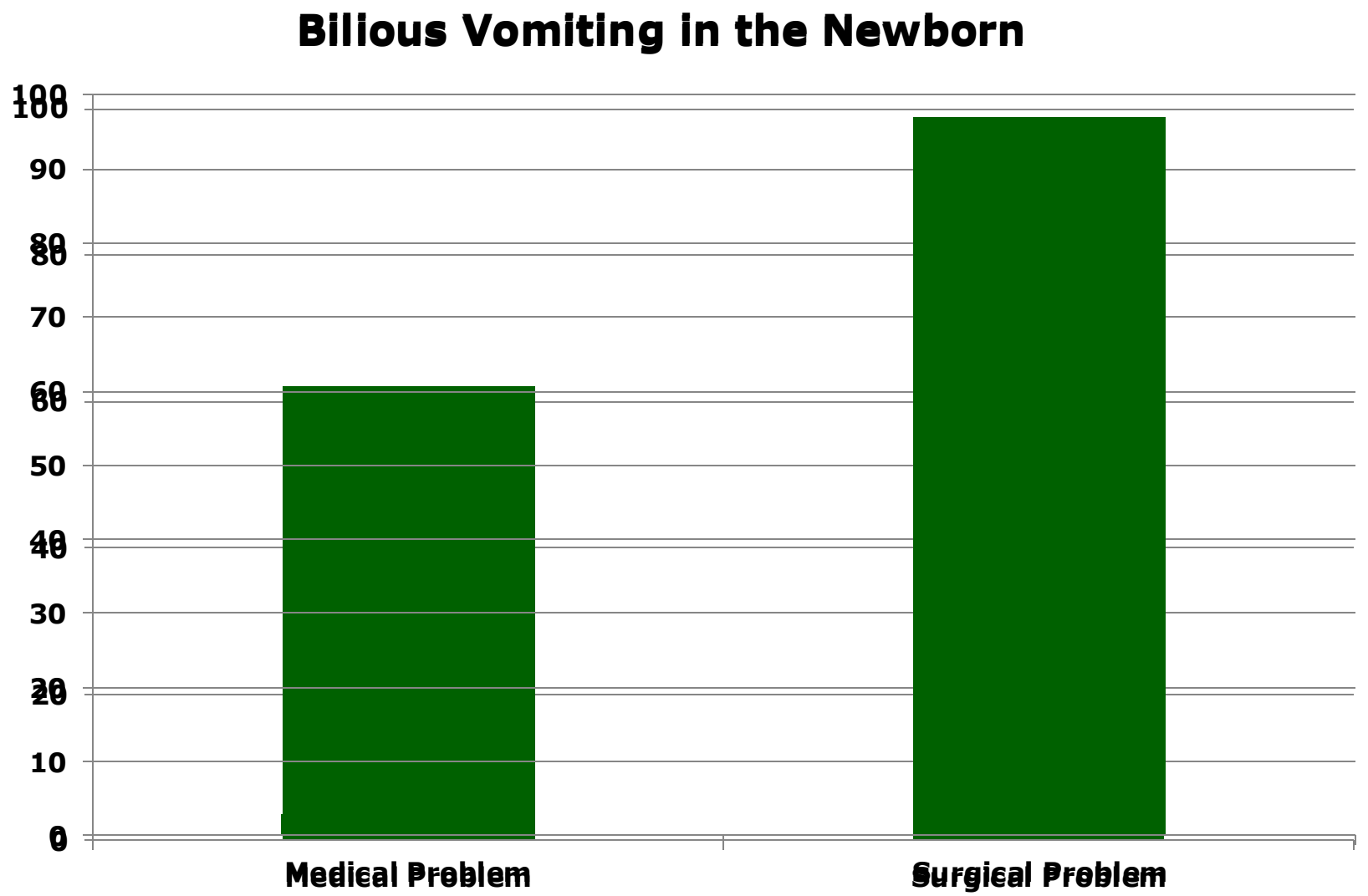
Biliou  ***nergency***

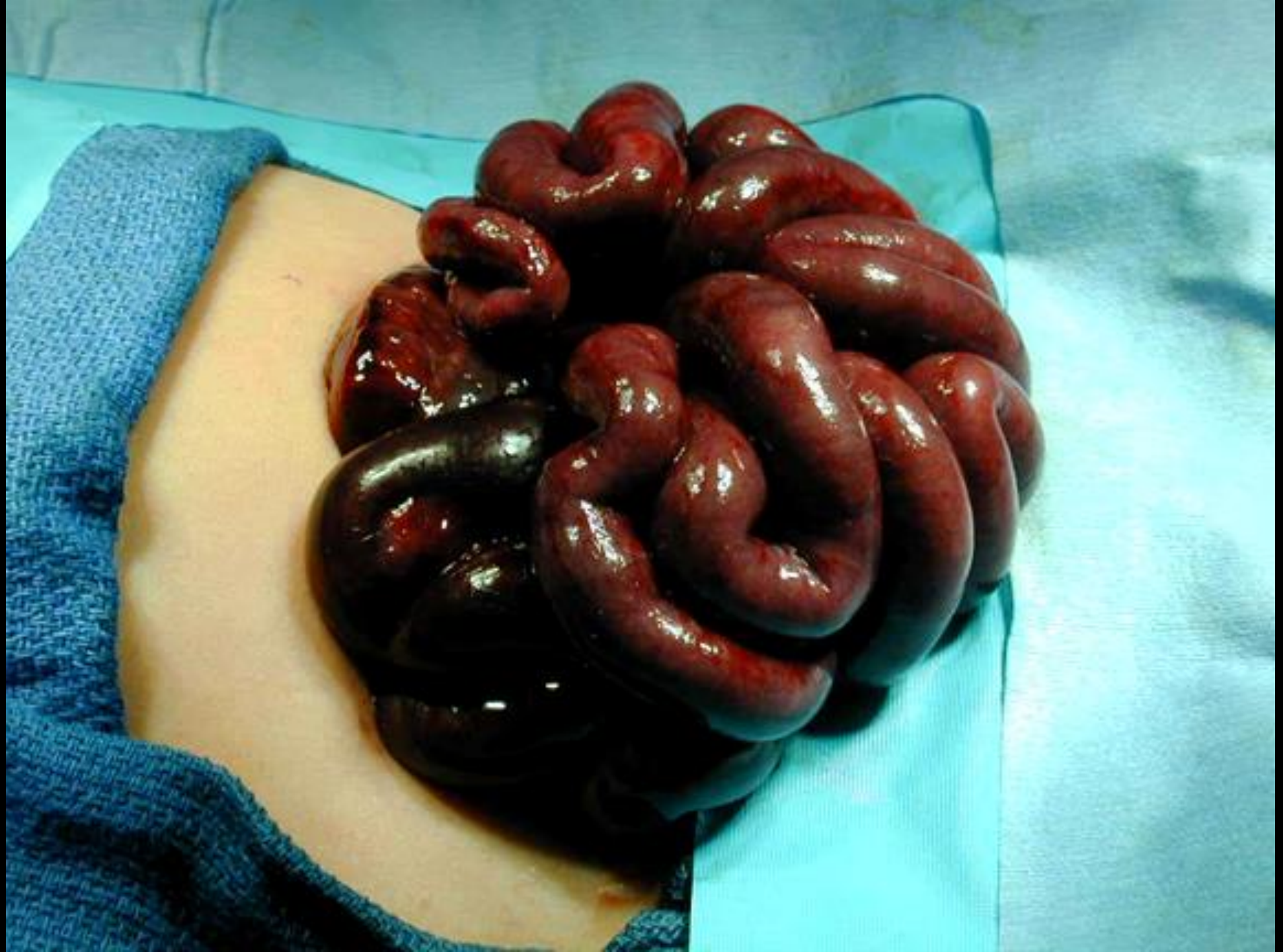

Bilious Vomiting in the Newborn
100
90
80
70
60
50
40
30
20
10
0
Medical Problem
Surgical Problem

Exam:

Infant fussy, but grunting and seems lethargic during exam

Malrotation with volvulus

- Symptoms
  - Acute onset of bilious vomiting (“The deadly vomit . . .”)
- General facts
  - 70% present in 1st month of life
  - 90% present by 1 year
- Treatment
  - Consider transfer by EMT from office to EW
  - Consider transfer to facility with pediatric surgeons/ICU/OR
  - Consult surgery early
  - Upper GI series *(if infant not showing signs of bowel ischemia)*
  - Initial treatment – IVF, nasogastric tube, antibiotics



Complications of midgut volvulus

- Mortality – 5-28%
- Short bowel syndrome
  - The five-year cost of caring for a child with short-bowel syndrome status approximately $1.5 million.
  - Intestinal transplant remains a difficult rescue with a high morbidity and mortality *Not to mention the emotional toll on family.*
- One of the more common medicolegal complaints brought against pediatric caregivers

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Learning Points

- Bilious vomiting in the first year of life may be associated with surgical processes that can have life-threatening and life-altering consequences. These processes must be excluded before the clinician will feel comfortable in investigating common and rare medical problems that may be associated with this sign.

Case-based surgical problems seen in the primary care setting

4-month-old boy with irritability and abdominal distention

You look up your notes on your EHR:

- Preterm at 32 weeks GA, some As&Bs
- No subsequent illnesses or hospitalizations
- Question of inguinal swelling before discharge
- Multiple ear infections past 2 months

What are you concerned about?

Do you need to see the baby?

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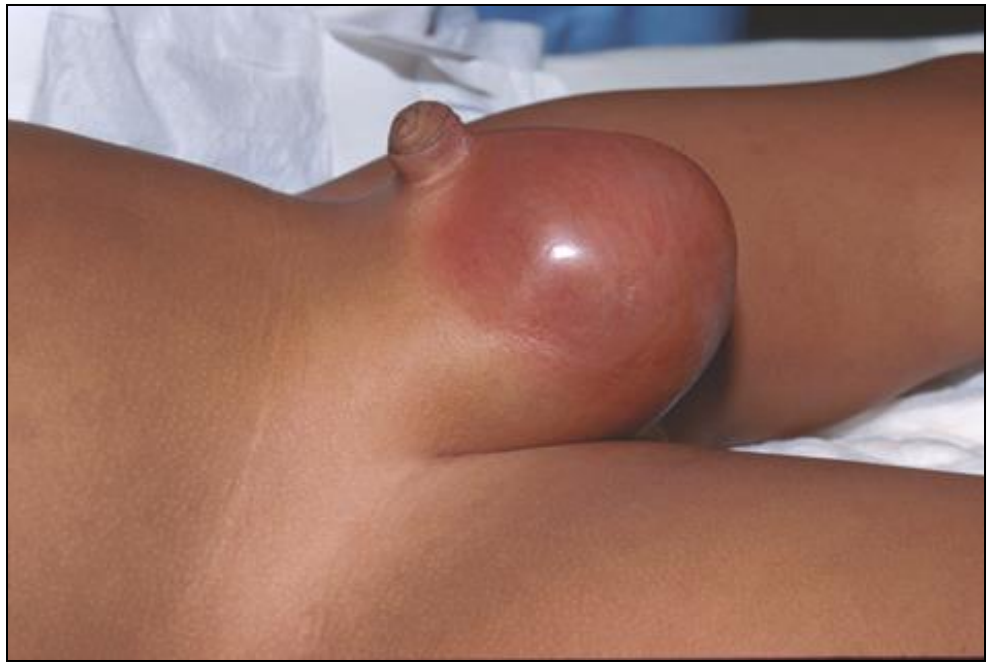
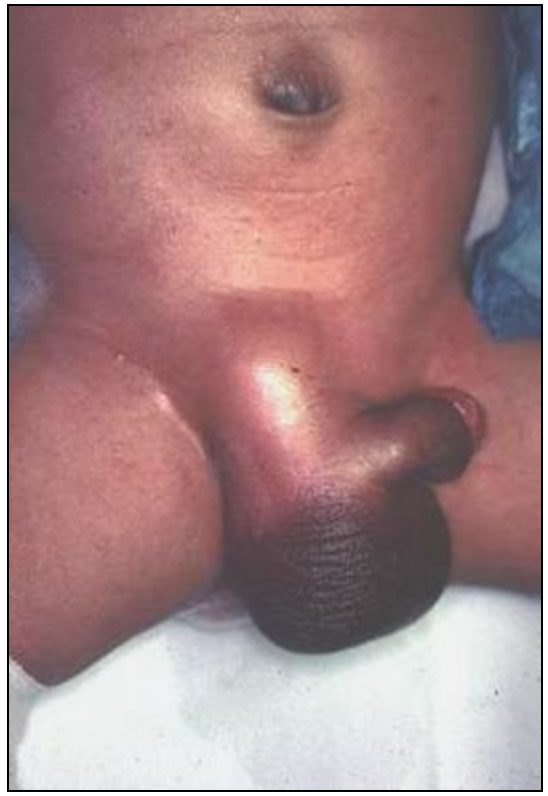
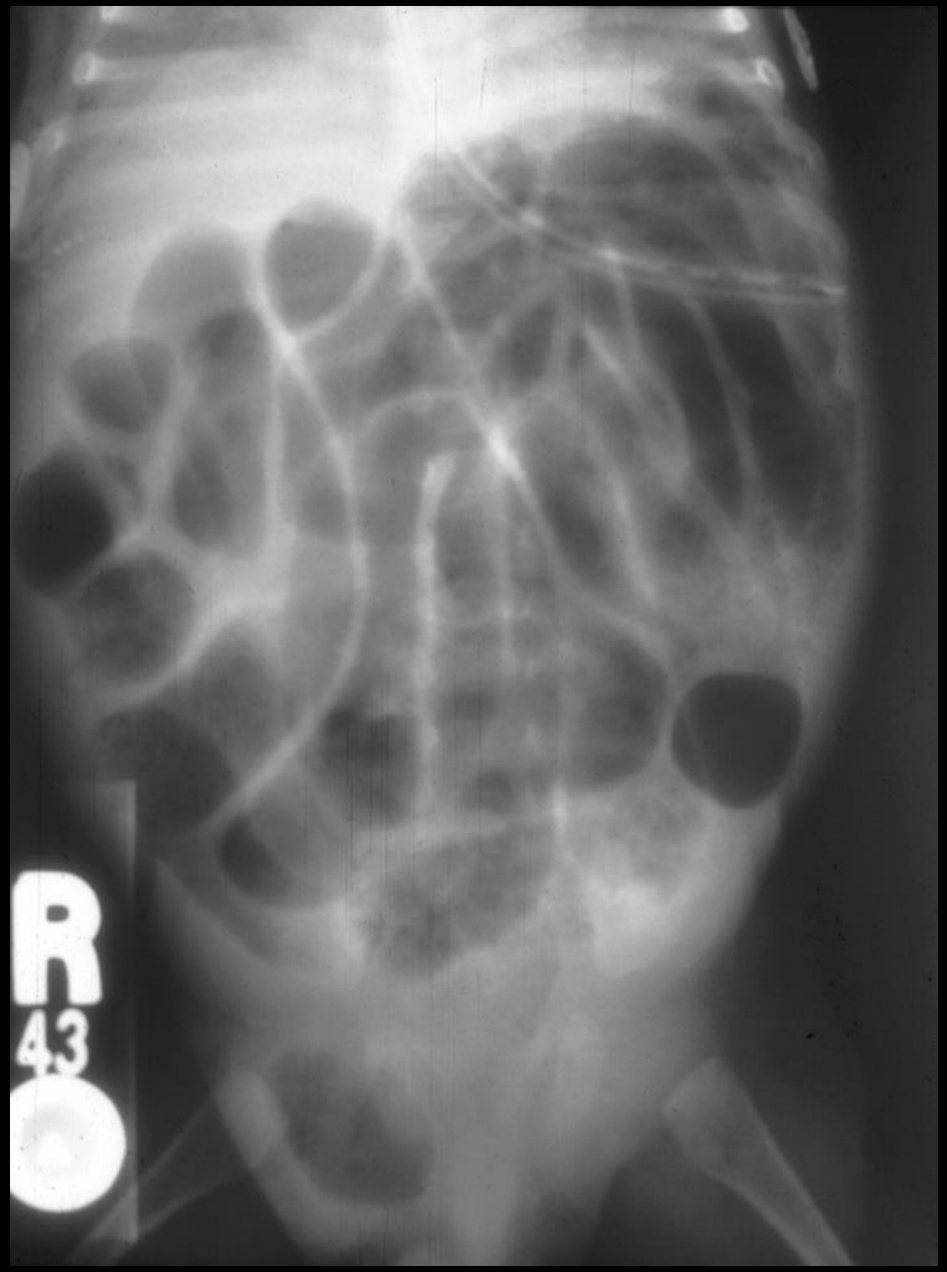
What do you look for on exam?





Inguinoscrotal mass – discolored, tender, irreducible



Abdominal film of infant with vomiting and distention in special care nursery

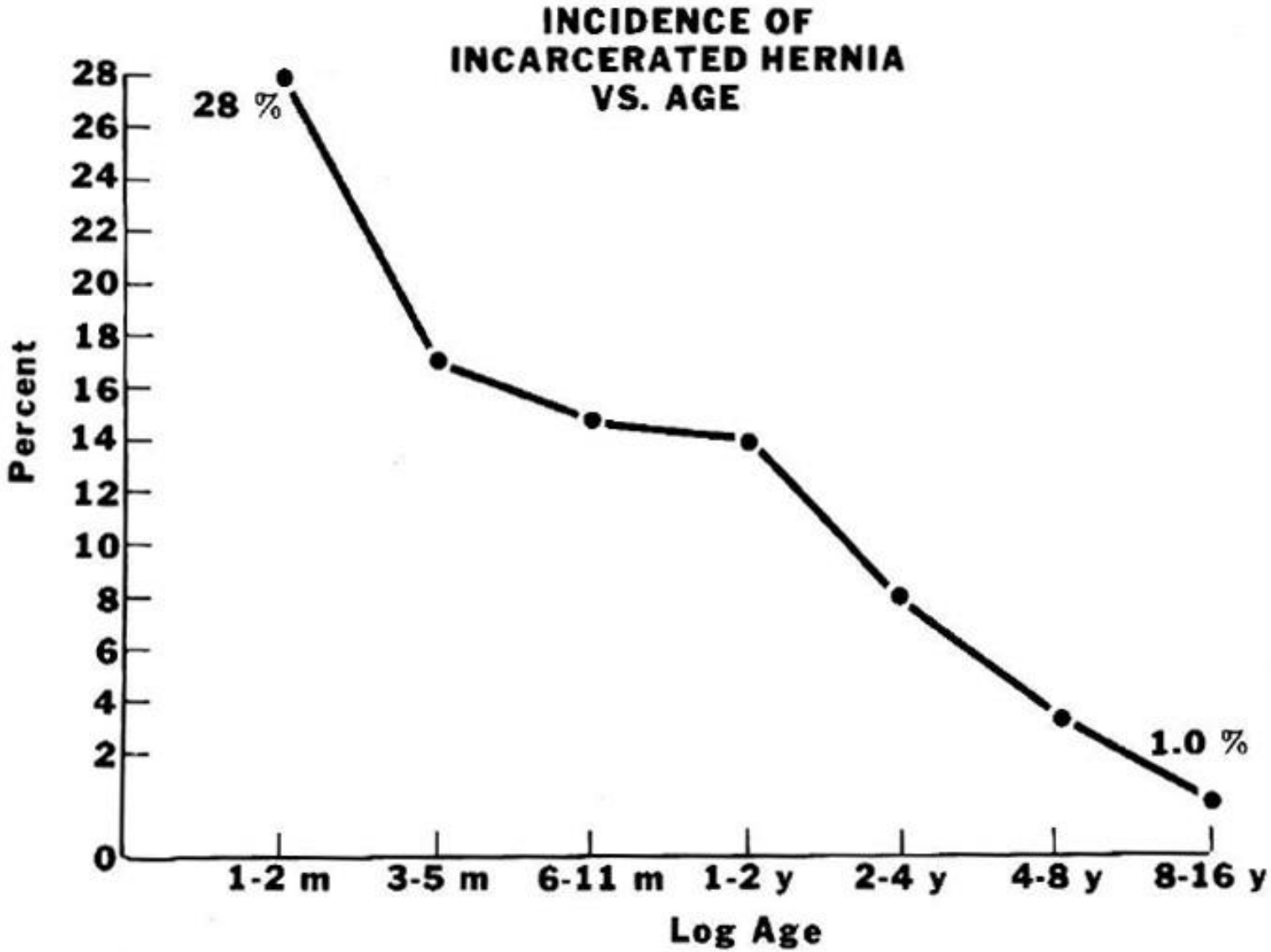
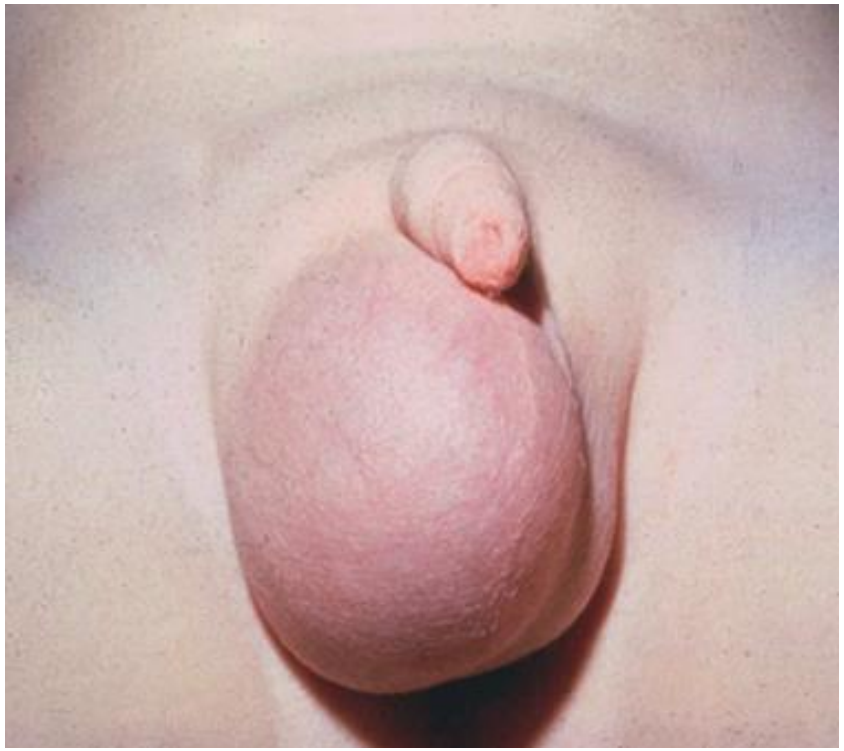


Fig 78–4.—Age-related incidence of incarcerated hernia in 351 infants and children. Newborn infants are at greatest risk for incarceration.

Rowe MA, Lloyd DA. (1986) Inguinal Hernia. In Welch KJ, Randolph JG, Ravitch MM, et al. *Pediatric Surgery. (*pp 779-793). Chicago • London: Year Book Medical Publishers, Inc

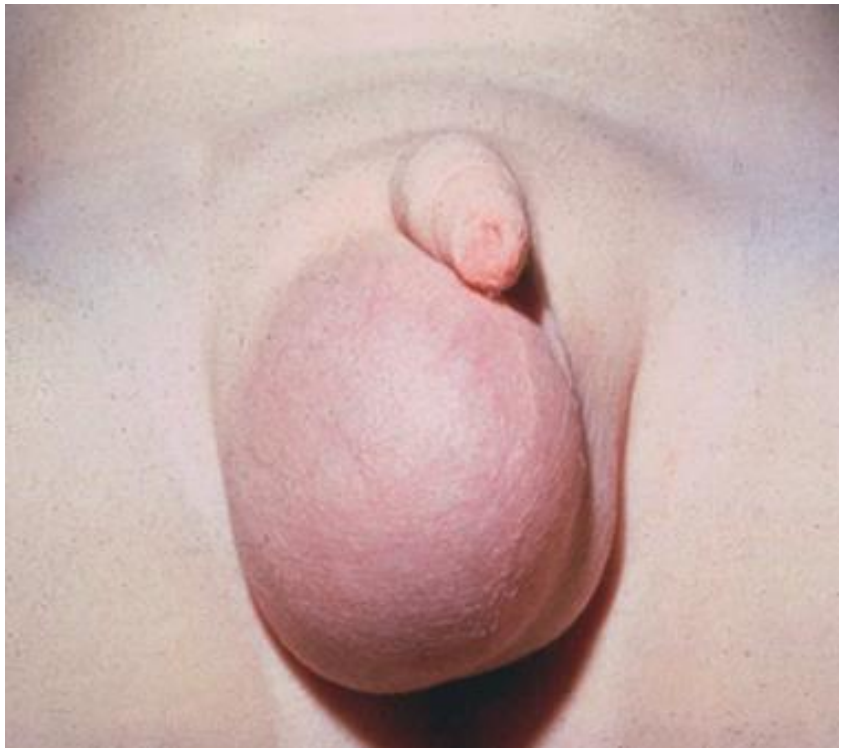
Inguinoscrotal mass

- Differential for inguinoscrotal mass in a child:
  - Inguinal hernia
  - Hydrocele
  - Lymphadenopathy
  - Torsion
  - Trauma
  - Germ cell tumor
  - Cryptorchid
- Examination
  - Palpation of cord structures
  - Transillumination
  - Ultrasound



Inguinoscrotal mass

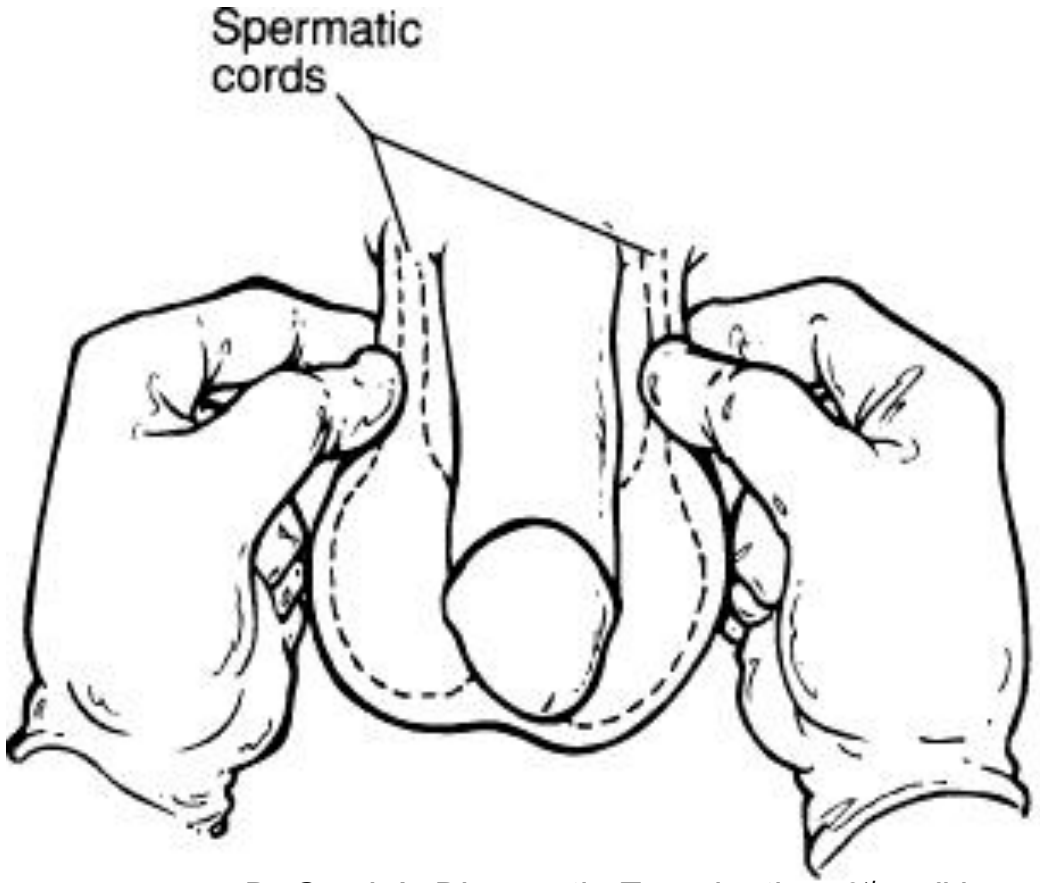
- Differential for inguinoscrotal mass in an infant and toddler:
  - ***Inguinal hernia***
  - ***Hydrocele***
  - ***Cryptorchid***
  - Lymphadenopathy
  - Torsion
  - Trauma
  - Germ cell tumor
- Examination
  - Palpation of cord structures
  - Transillumination
  - Ultrasound



Hydrocele versus Hernia

Palpation of cord structures at scrotal neck

- Palpable vas deferens – almost certainly hydrocele
- Thickened scrotal neck and uncertain if vas palpable – probable hernia, possibly incarcerated



LeBlond RF, DeGowin RL, Brown DD. *DeGowin's Diagnostic Examination, 9th Edition*.

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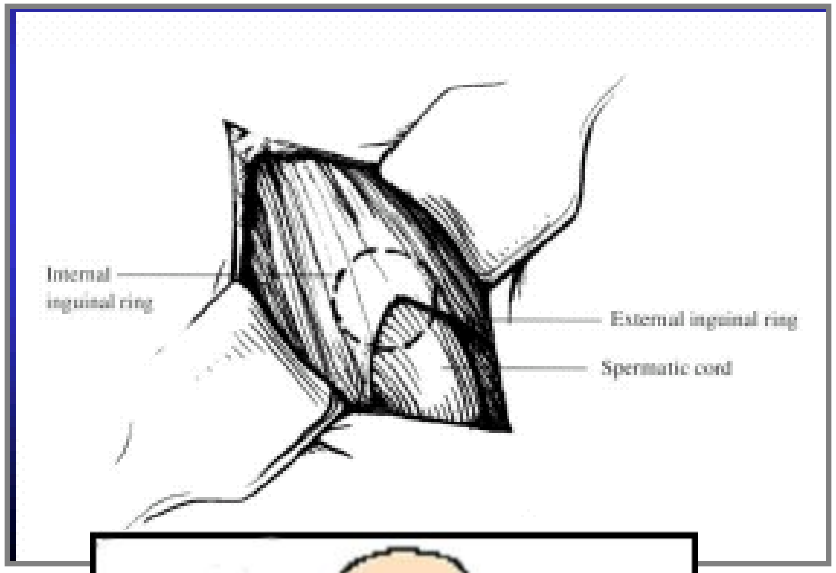
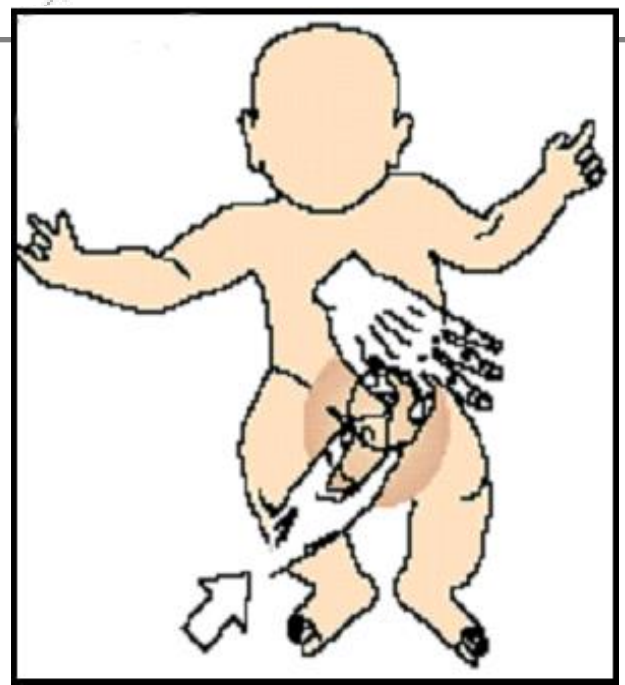
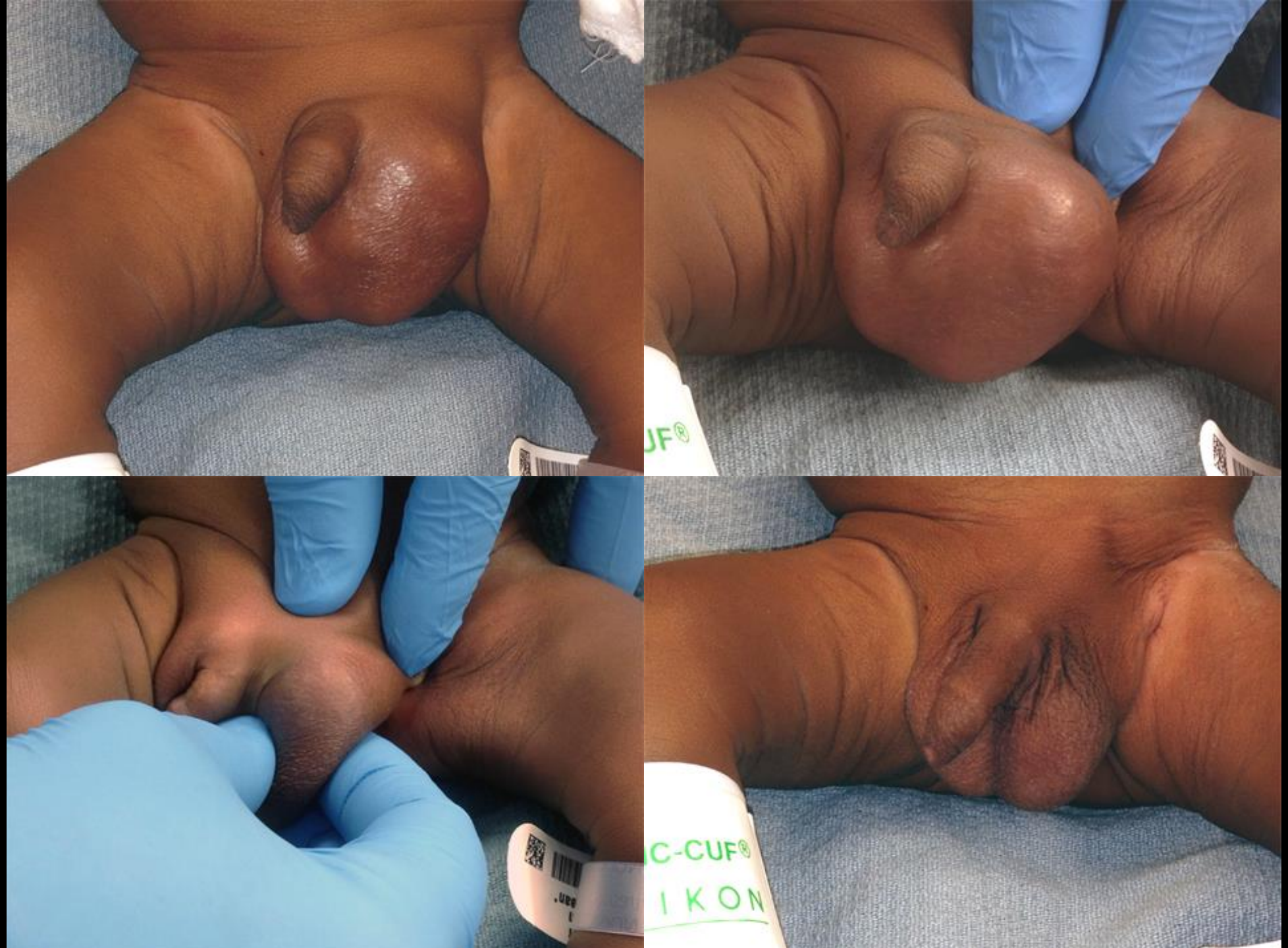
Reducing an Inguinal Hernia

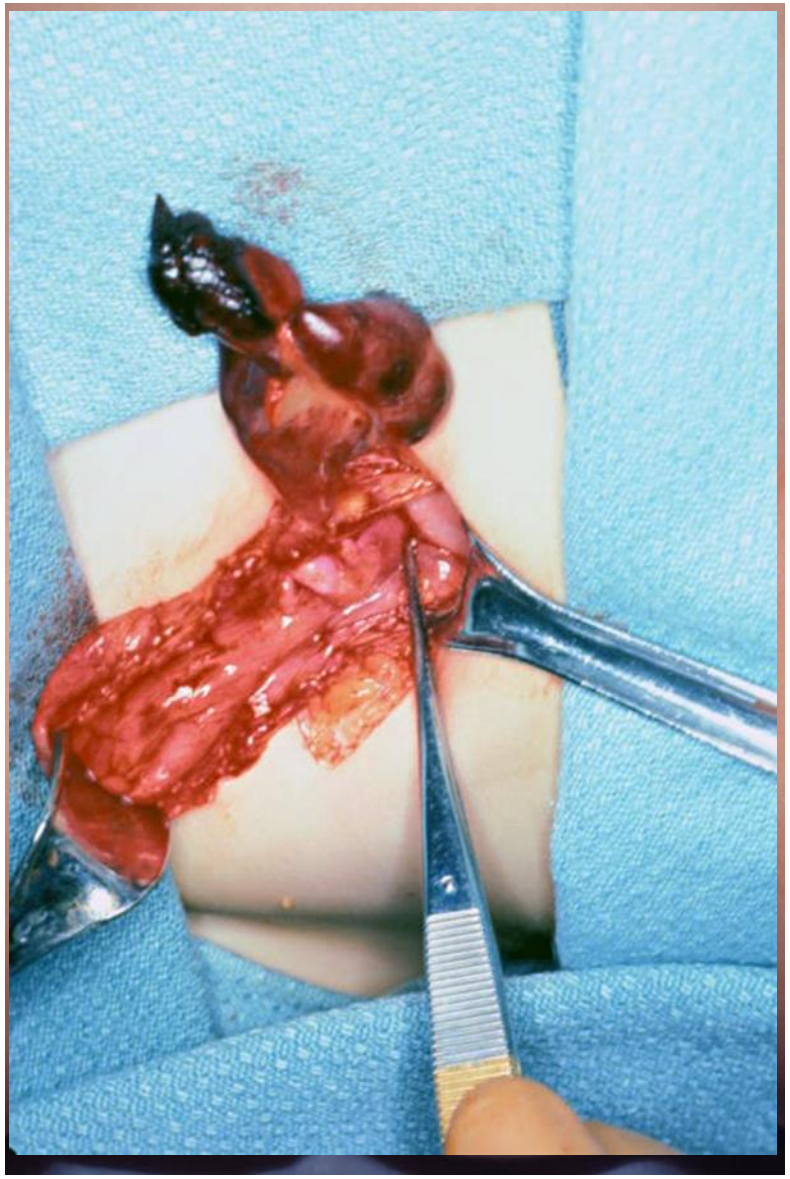
- Be sure not a hydrocele or an undescended testis
  - Palpate cord structures above swelling
  - Transillumination (?)
- Sedation (sugar water/versed / morphine)
- You need two hands
  - Superior hand straightens hernia sac
  - Scrotal hand – gentle squeeze
    - Constant pressure
    - Upward and inward
- Patience!







Case-based surgical problems seen in the primary care setting



Learning Points

- Inguinal and umbilical hernias are common pediatric problems.
- Incarceration in an inguinal hernia is common in the first two years of life.
- Because of that risk, urgent surgery for inguinal hernias in the infant and toddler is recommended.
- Incarceration of an inguinal hernia may lead
  - Intestinal ischemia in 1%
  - Testicular hypoplasia or atrophy in 10%

Case-based surgical problems seen in the primary care setting

16-year-old female with lower abdominal pain

- Sudden onset this morning
- Severe ("Never felt anything like this"; "Much different than menstrual pains"); so severe she was seen by the school nurse and sent home from school
- Location
- Nauseated, vomited twice
- Appetite diminished since onset of pain
- Nature of pain (constant)
- Menstrual / sexual history
- History of chronic GI symptoms; told she has irritable bowel syndrome

16-year-old female with lower abdominal pain

- Exam
  - Uncomfortable with movement
  - Temp = 100.5
  - Tender to palpation, especially in right lower abdomen

What is your differential?

What else would you like to do?

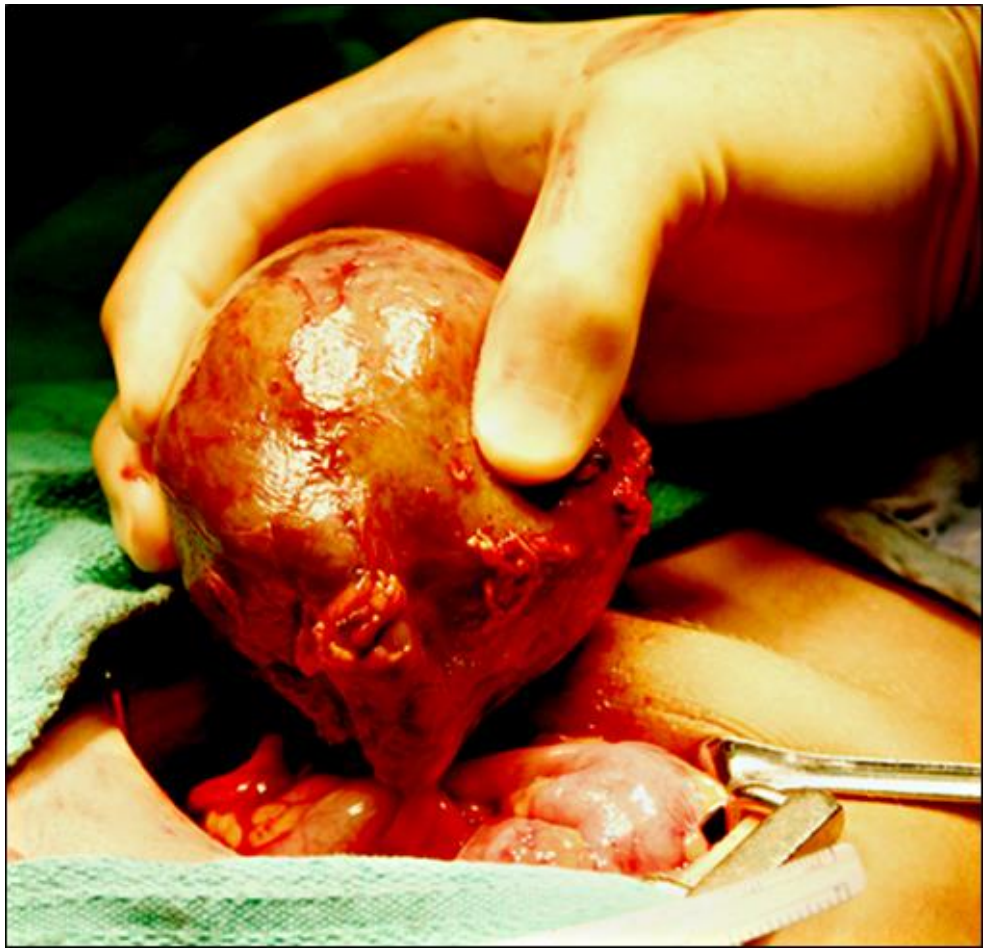
What tests do you want to order?

16-year-old female with lower abdominal pain

- Blood tests
- Urinalysis
- β–HCG
- Plain film?
- Ultrasound?
- CT scan?

Ovarian torsion

- Symptoms nonspecific
- Classically – sudden onset, severe, unilateral lower abdominal pain, usually with nausea and vomiting
- Tenderness may or may not be present
- Infrequent in premenarchal females
- Usually occurs in a pathologically enlarged ovary (cyst, tumor)
- Ovarian salvage is possible and best if surgery is done early.
- Up to a third of ovarian lesions in children can be malignant
- Professional societies are increasingly recommending detorsion without oophorectomy



Learning Points

- Ovarian torsion often results in moderately severe lower abdominal pain
- In the evaluation of a female with lower abdominal pain, ultrasound should be the initial imaging modality
- Malignant ovarian neoplasms can occur even in the adolescent female
- In the adolescent patient, cysts less than 5 cm are unlikely to torse

Case-based surgical problems seen in the primary care setting

Worsening of GI illness in 16-month-old infant

Unfortunately

- Four hrs later – mom reports toddler passed mucousy stool
- Toddler seems lethargic and pain may be worsening
- You ask her to bring her to the office

Exam

- Lethargic
- Abdomen soft, nontender
- Empty RLQ (Dance's sign)
- Mass in upper abdomen

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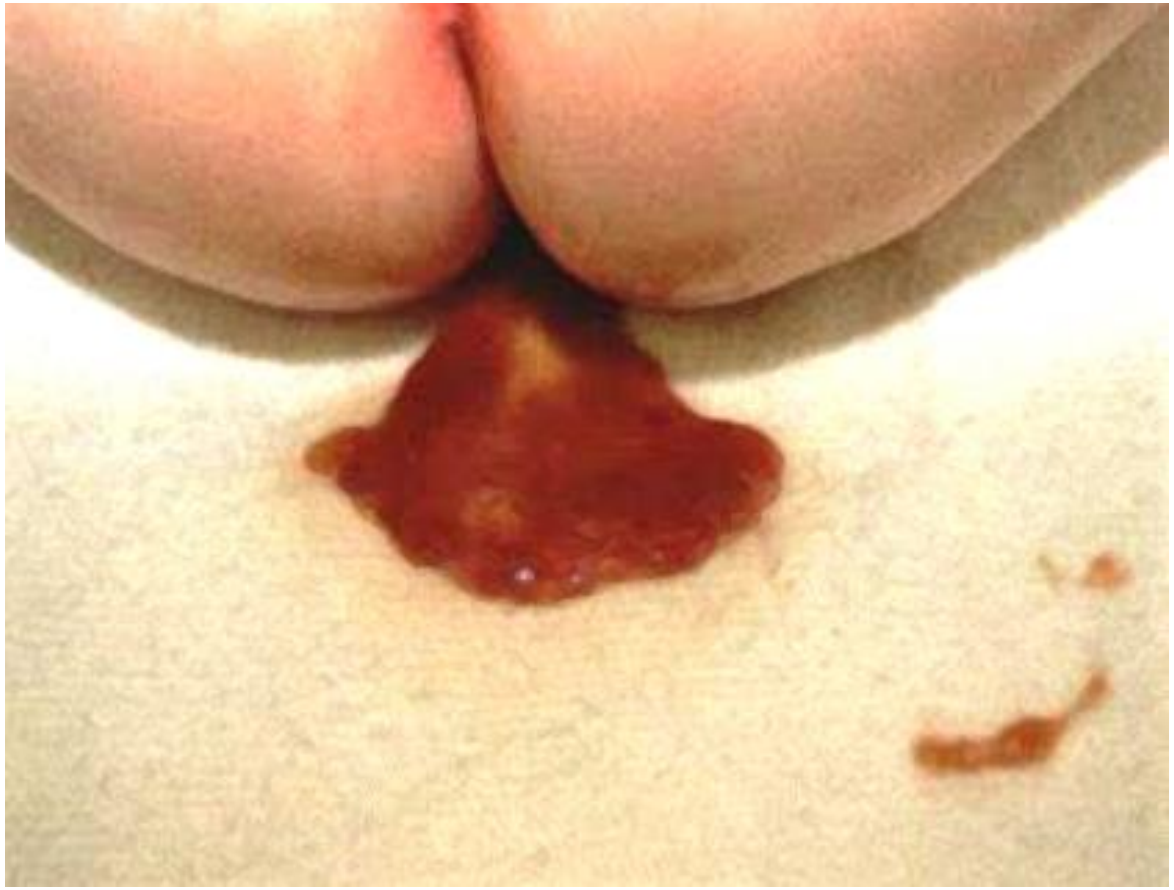
Intussusception

Symptoms and signs

- Irritability with intervening lethargy
- Episodic arching
- Vomiting
- Currant jelly stools
- Diaphoresis

Facts

- 3 months – 3 years
- 30% have prior viral illness or gastroenteritis



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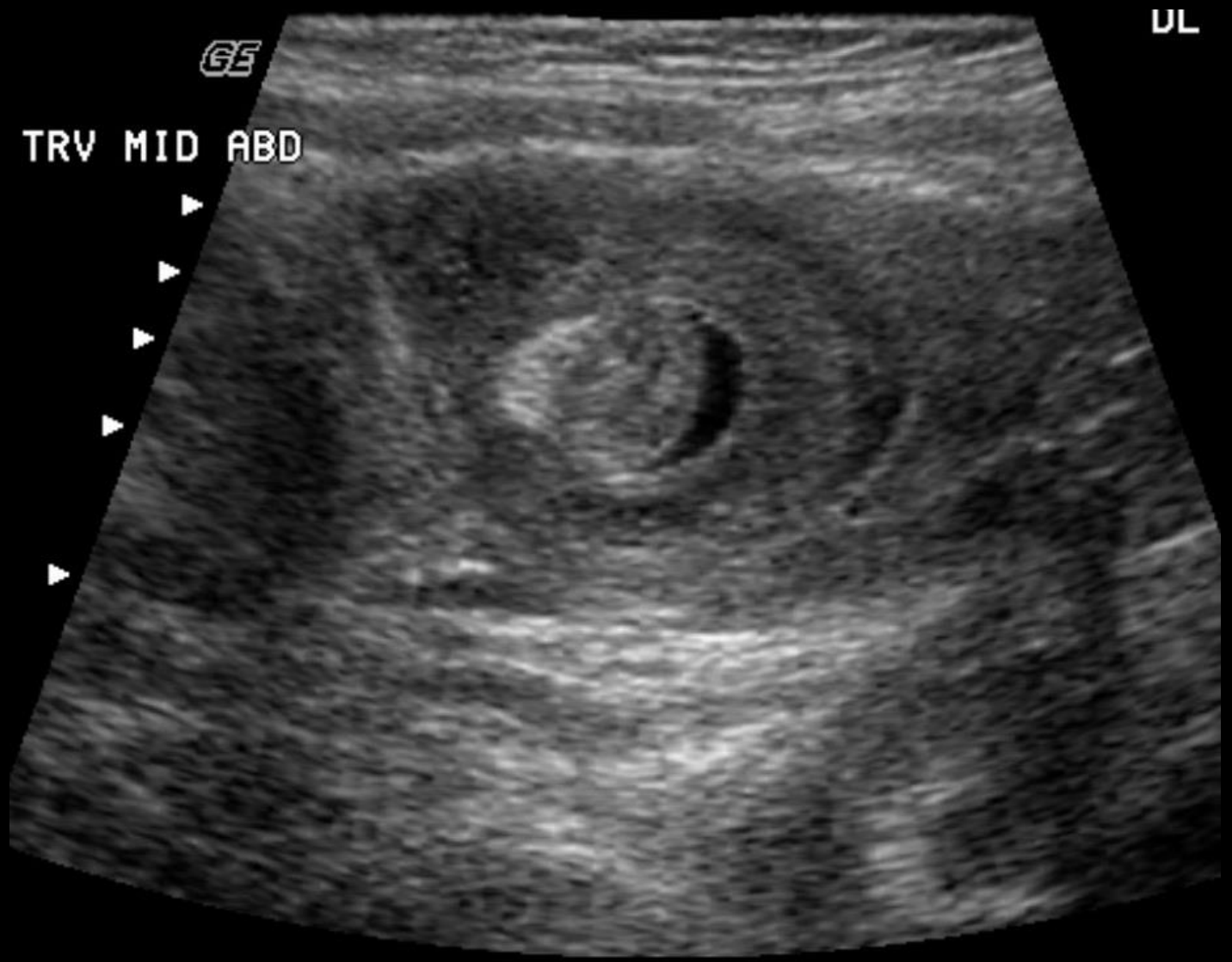
Diagnostic studies

- Ultrasound for diagnosis
  - Bull's eye
  - Pseudo-kidney
  - May see evidence of small bowel obstruction
- ~75% successfully reduced by imaging
  - 10% chance of recurrence usually in the first 48-72 hours
  - Increasingly centers watching in ER for 6-12 hours after reduction rather than admitting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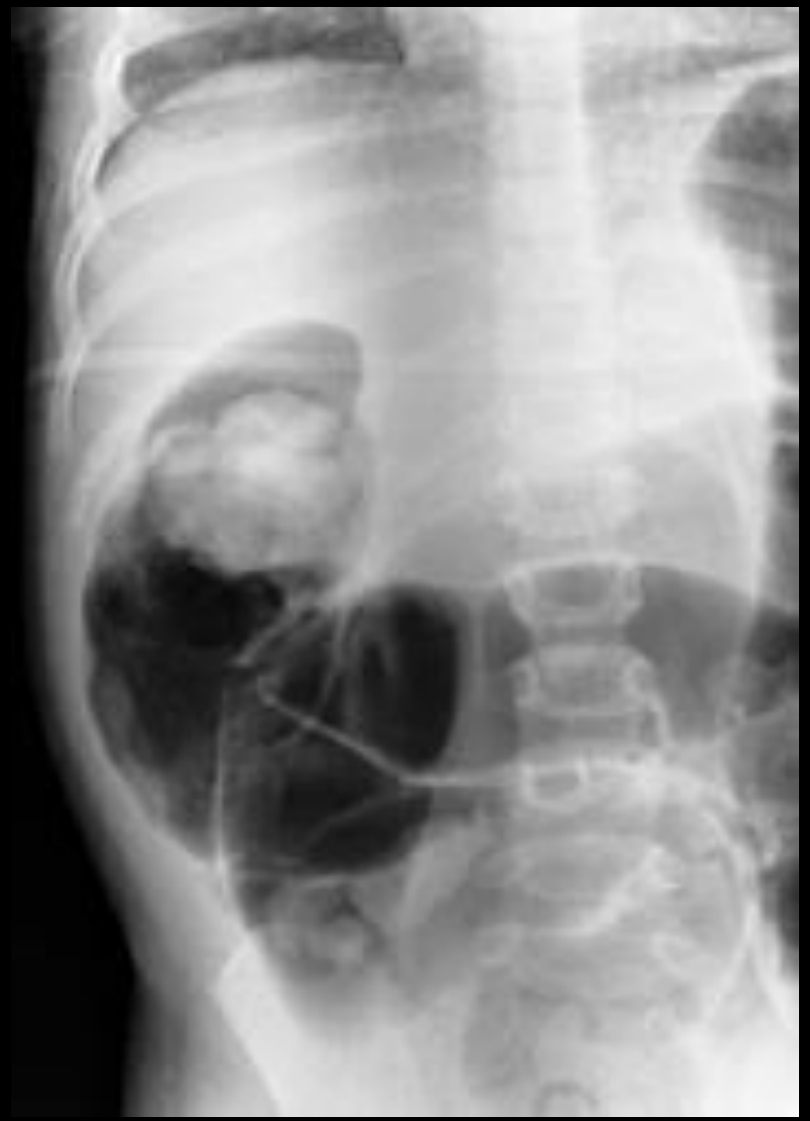

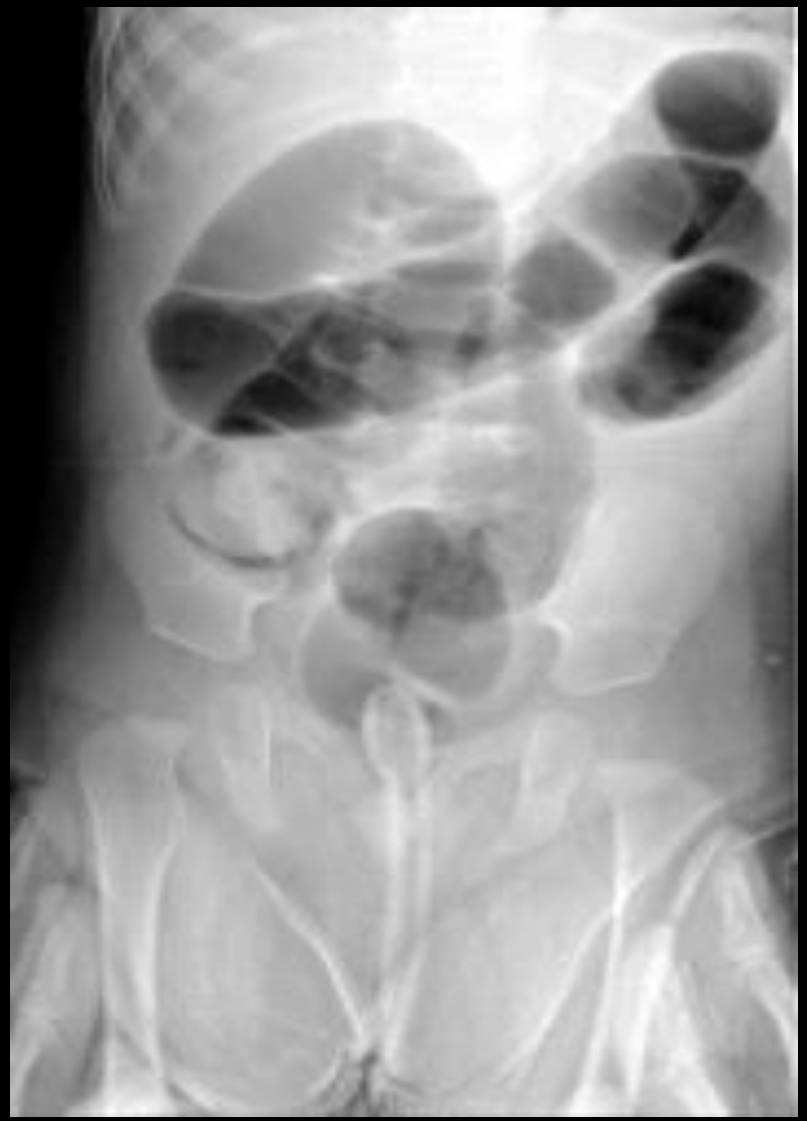

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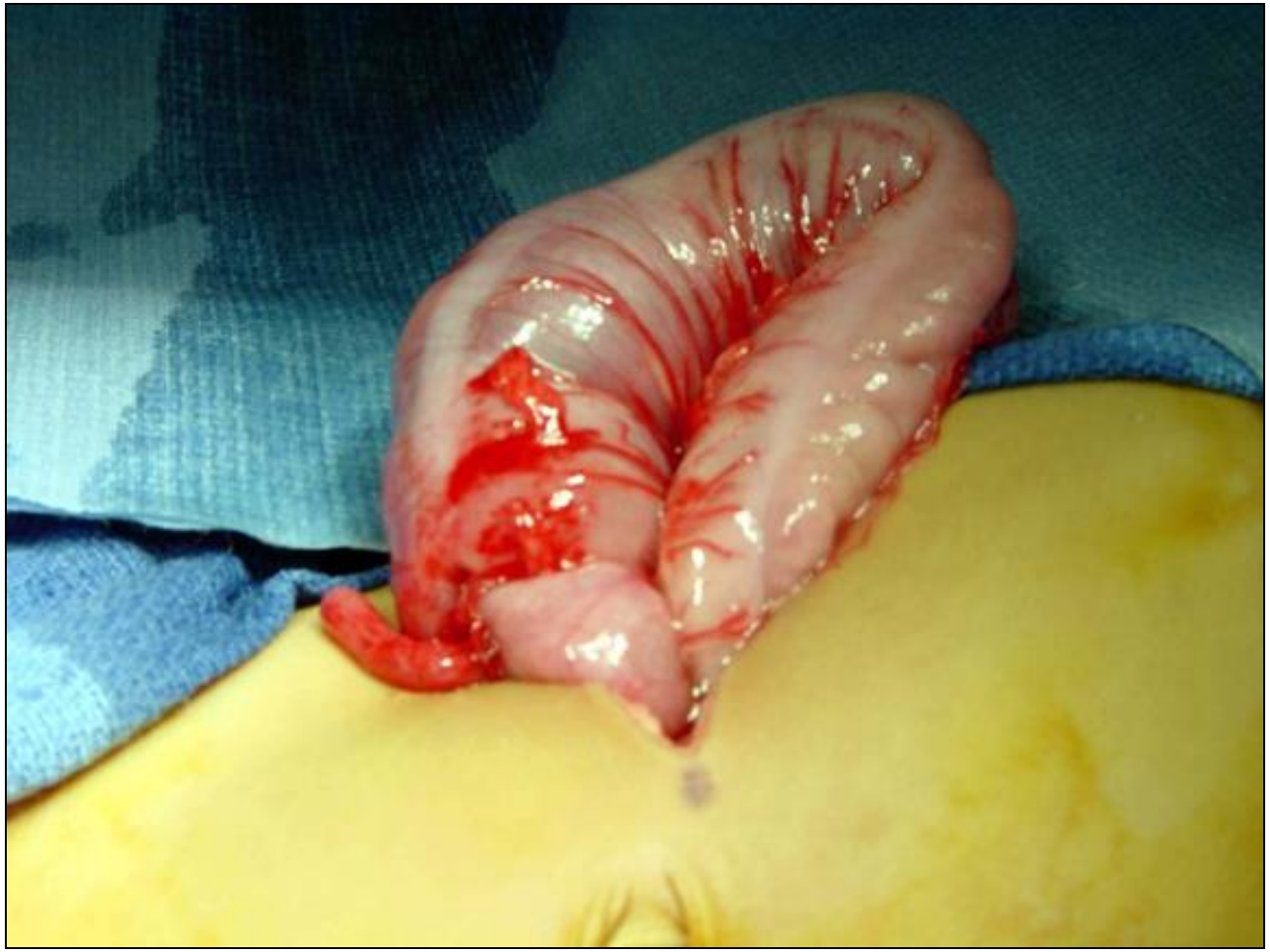
Surgery

- Needed in 15-30% of cases
- 10% will need resection
- 3% chance of recurrence
- Incidental appendectomy



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Learning Points

- Lethargy is a common symptom in young patients with intussusception
- 15-30% of the children will need surgery
- Recurrence of the intussusception is common (10% following radiographic reduction and 3% following surgical reduction) and usually occur in the early post-reduction period.
- Occasional surgical lead points may be identified in any age group but are more likely in patients under 3 months or more than 4 years

Case-based surgical problems seen in the primary care setting

Toddler with new onset of cough and wheezing

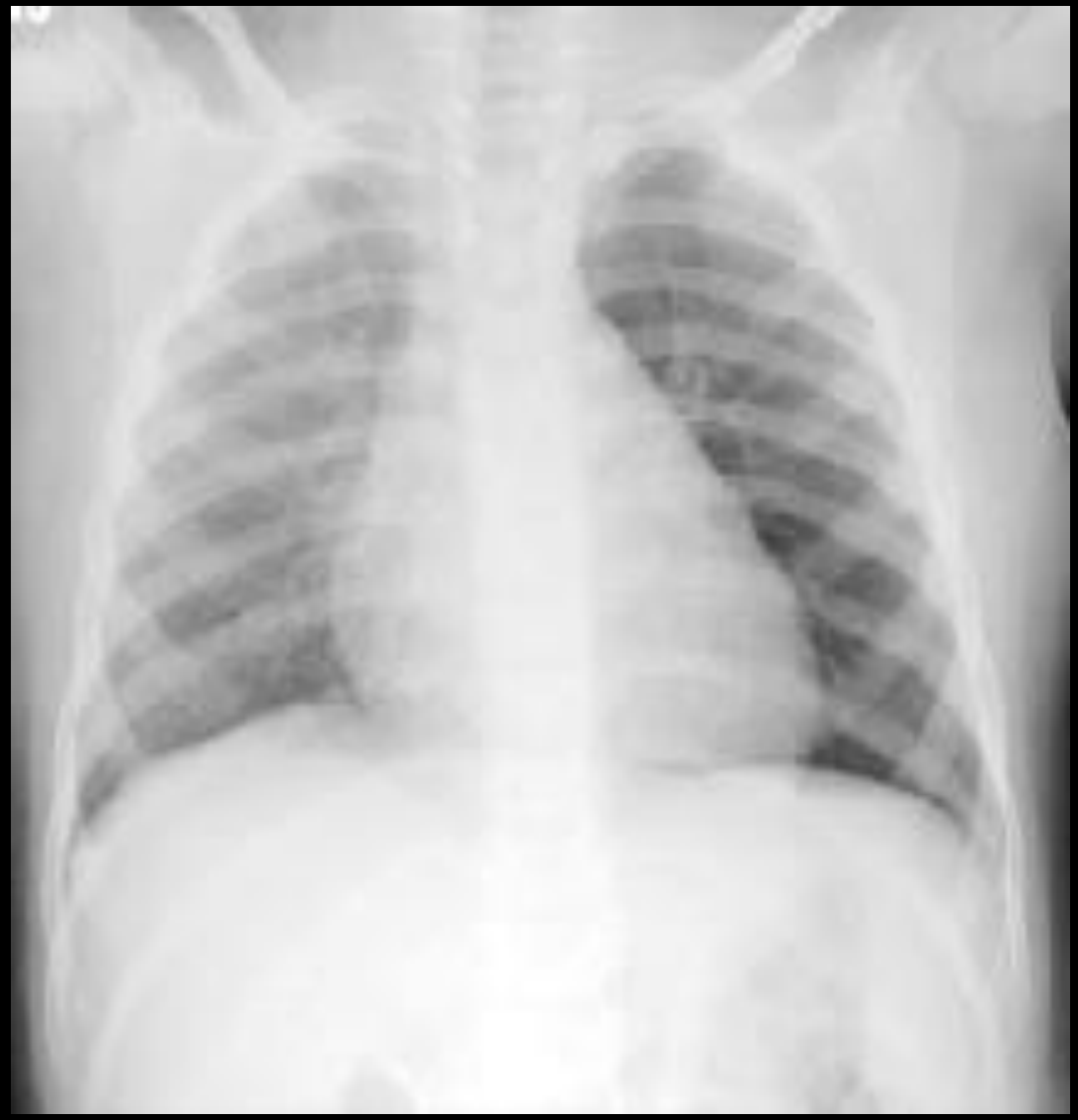
- 2-year-old boy with 4-day history of coughing
- Mother reports child has been wheezing and felt warm for the past 24-48 hours
- No past history of asthma or reactive airway disease.

You ask the mother if there is anything else . . .

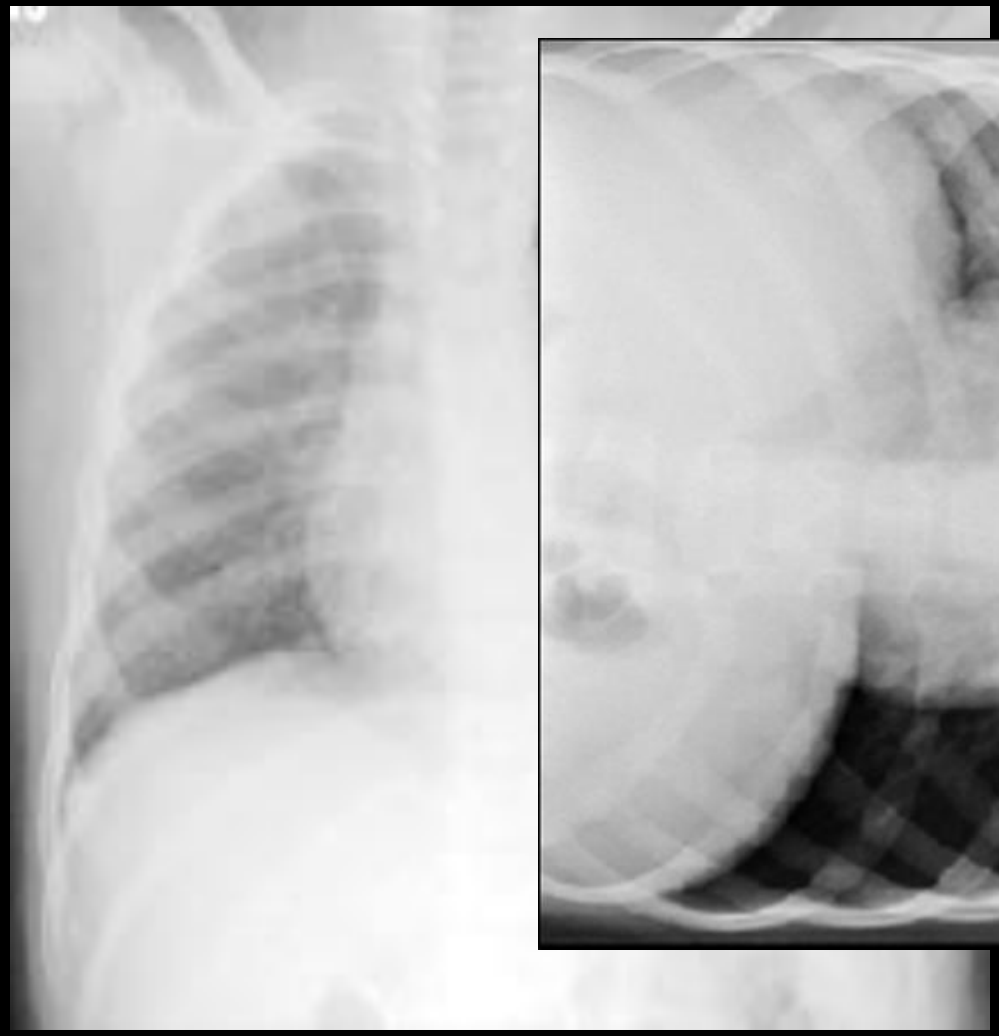
- She remembers during a party at the house a few days ago a bowl of fruit and nuts fell over and the child was found near it choking. The toddler then seemed fine but shortly thereafter the cough started.

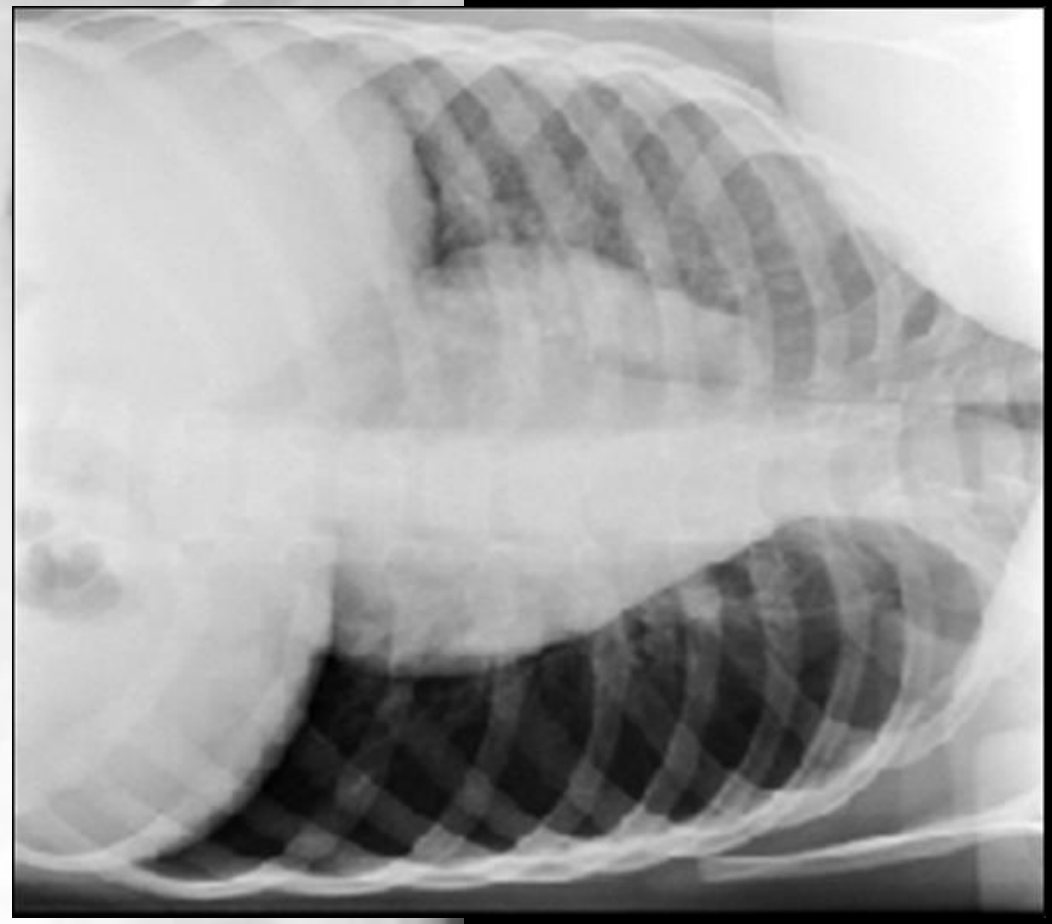
Toddler with new onset of recent cough and wheezing

- Appears healthy
- Breathing comfortably
- Wheezing over left lung field



AP view

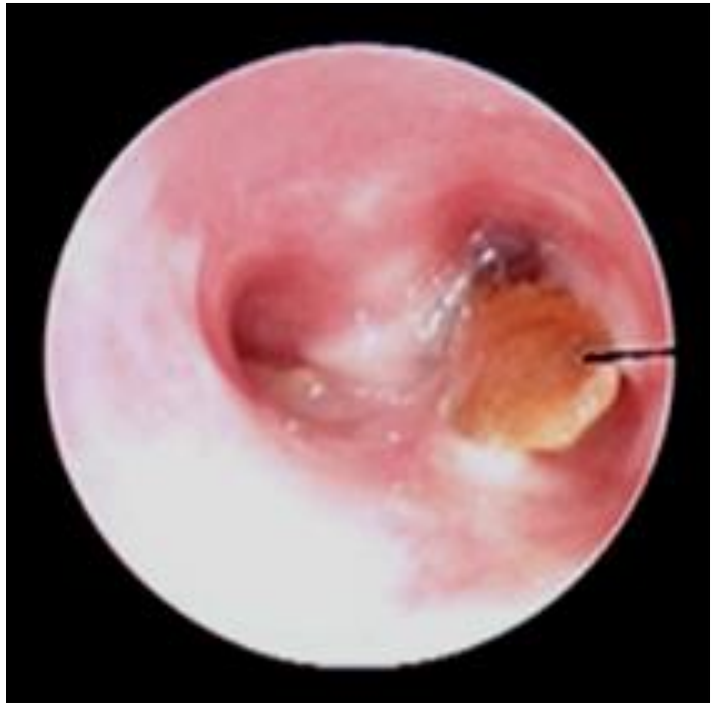




AP view **Decubitus**

Airway Foreign Body

- 1 to 3-year-olds
- Nuts most common (peanut oil very irritating)
- Exam: coughing, wheezing
- CXR may not be helpful
  - ✓ Only 5-15% of aspirated FB are radiopaque in children
  - ✓ Lungs may be normal, collapsed, or hyperexpanded
- If history and exam are suggestive (even with normal x-rays) → OR for bronchoscopy
  - accept a 20% false-negative rate
- More recently some centers are advocating for CT imaging if story is atypical



Case-based surgical problems seen in the primary care setting

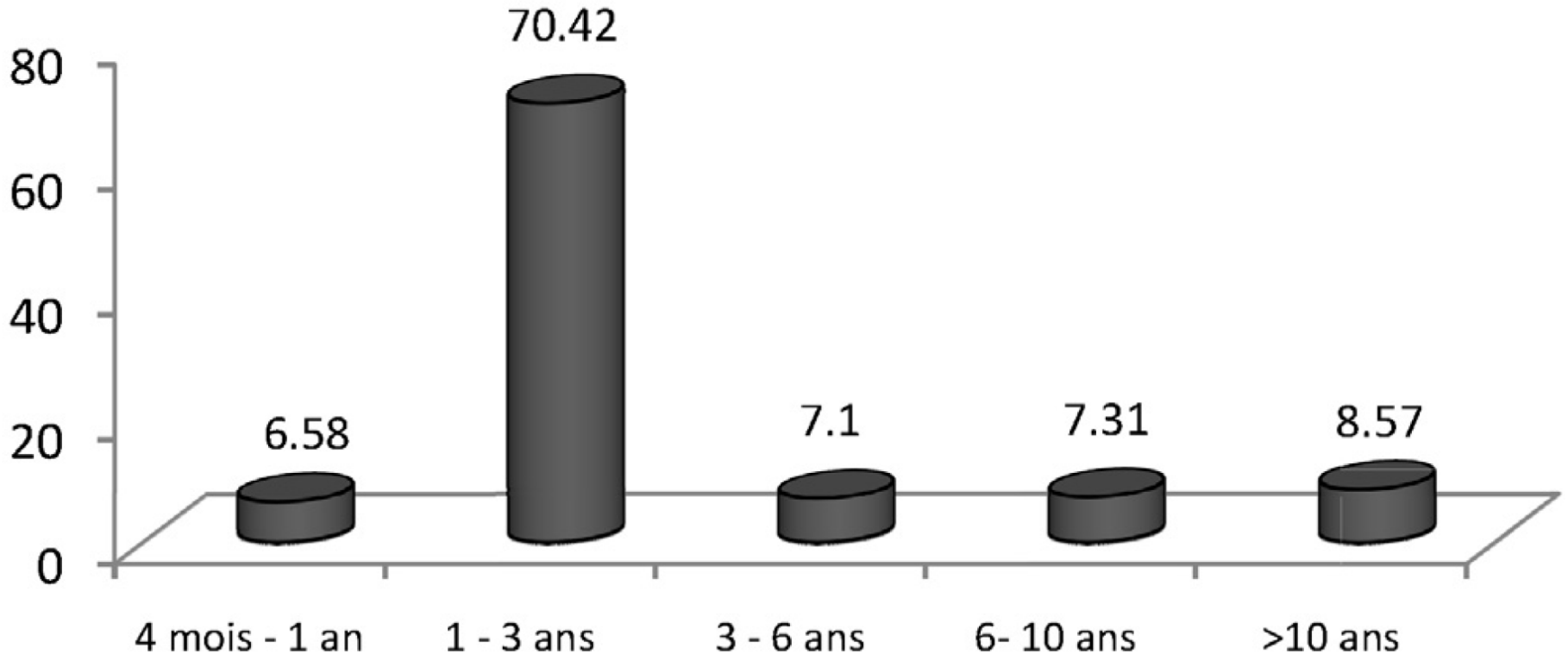
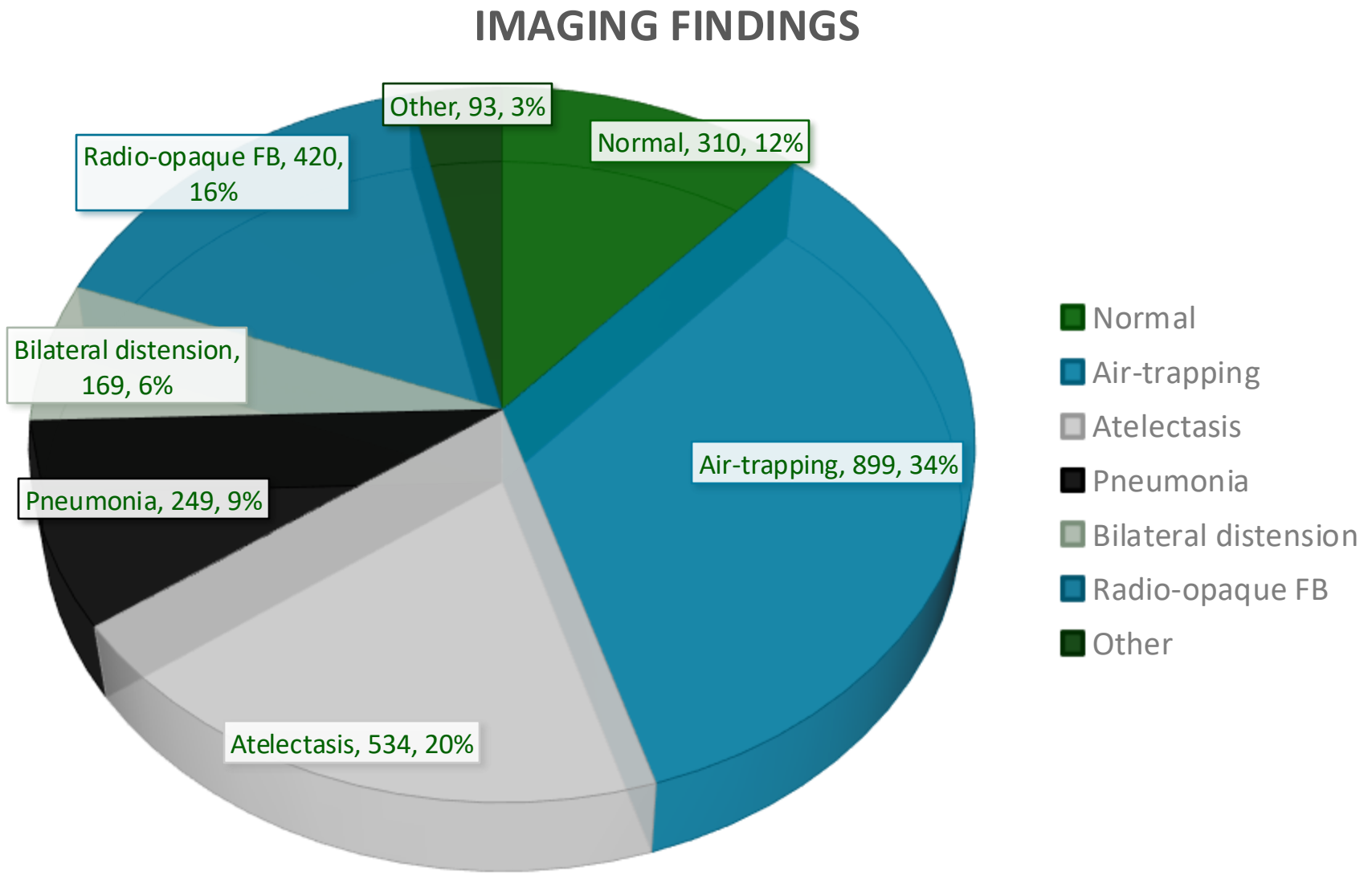


Fig. 2. Age of patients.

Boufersaoui A, et al. Foreign body aspiration in children: Experience in 2624 patients. *Int J Pediatr Otolaryngol* 77:1683-88, 2013

Case-based surgical problems seen in the primary care setting



Boufersaoui A, et al. Foreign body aspiration in children: Experience in 2624 patients. *Int J Pediatr Otolaryngol* 77:1683-88, 2013

Case-based surgical problems seen in the primary care setting

Boufersaoui A, et al. Foreign body aspiration in children: Experience in 2624 patients. *Int J Pediatr Otolaryngol* 77:1683-88, 2013

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Learning Points

- Children aspirate the darnedest things
- Early recognition usually leads to successful bronchoscopic retrieval
- Chronic aspirated foreign bodies may lead to recurrent or refractory pneumonias
- Chest x-ray findings may show many different findings although air-trapping is the most common in the pediatric age group

Case-based surgical problems seen in the primary care setting

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Medical Malpractice and the Pediatrician

- **Annual percentage 3.1%**
- **Annual indemnity rates 0.5%**
- **Mean indemnity payment $562,180**
  - **Permanent injury payments > Fatality payments> Temporary injury payments**

Jena AB, Chandra A, Seabury SA. Malpractice risk among US pediatricians. Pediatrics 131:1148-54. 2013

Case-based surgical problems seen in the primary care setting

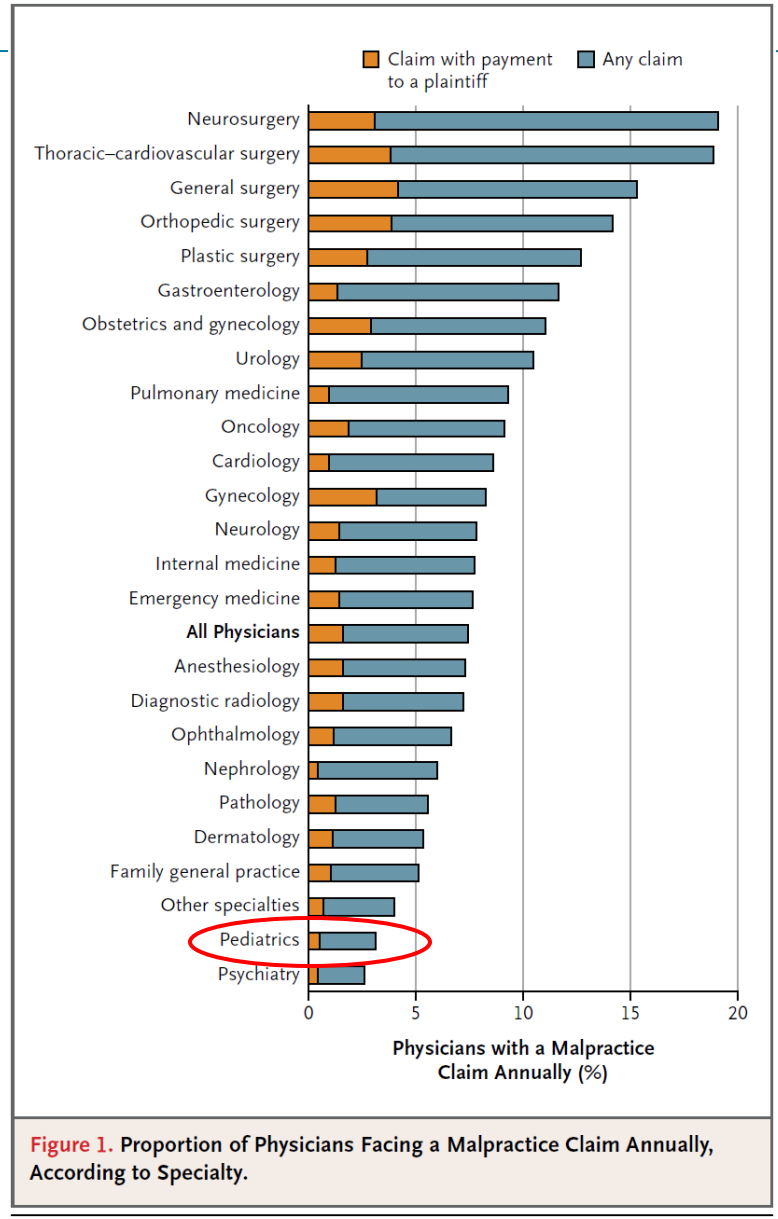

Figure 1. Proportion of Physicians Facing a Malpractice Claim Annually, According to Specialty.

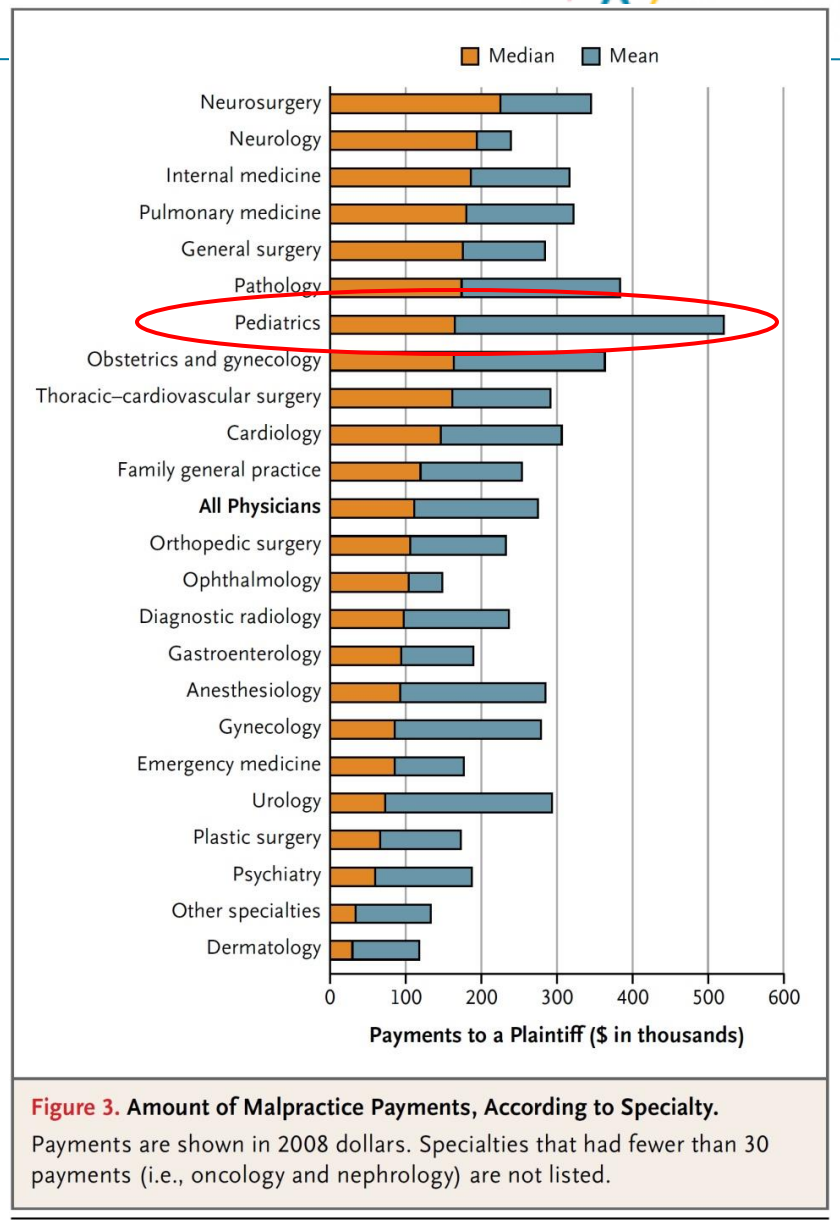

Figure 3. Amount of Malpractice Payments, According to Specialty.
Payments are shown in 2008 dollars. Specialties that had fewer than 30 payments (i.e., oncology and nephrology) are not listed.

Jena AB, et al. *Malpractice risk according to physician specialty*. New Engl J Med 365:629-36. 2011

Case-based surgical problems seen in the primary care setting

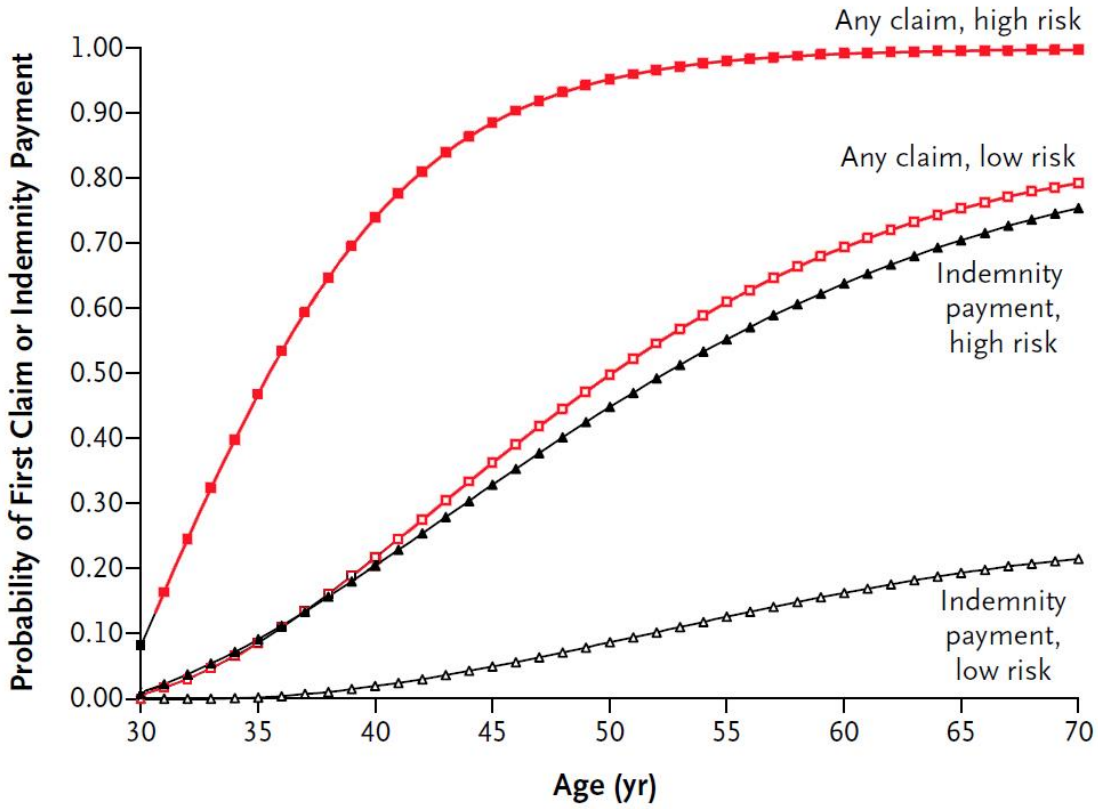

Figure 4. Cumulative Career Probability of Facing a Malpractice Claim or Indemnity Payment, According to Risk of Specialty and Age of Physician.

Cumulative probabilities were estimated from a multivariate linear regression model with adjustment for physician random effects, physician specialty, state of practice, and county demographic characteristics.

Jena AB, et al. *Malpractice risk according to physician specialty*. New Engl J Med 365:629-36.2011.

Case-based surgical problems seen in the primary care setting

1. **Document pertinent positive and negative clinical findings. If a symptom or sign is critical in a disease process, make sure you have written it in the medical record.**
2. **Document carefully. Entries should be clear, complete, and free of flippant, critical, or other inappropriate comments. Whenever writing on a medical chart, assume that "Dear Mr/Ms Attorney" is written at the top.**
3. **In documentation, quality is more important than quantity.**
4. **Never underestimate the importance of referral to specialists.**
5. **Communication between you and the specialists and you and the parents is critical.**
6. **Avoid language that blames or embellishes.**
7. **Never blame a parent's care**

McAbee GN, et al. Medical diagnoses commonly associated with pediatric malpractice lawsuits in the United States. Pediatrics, 122:e1282–e1286, 2008.

MassGeneral for Children

“We see only what we look for; we recognize only what we know”

Merrill Sosman, MD
Professor of Radiology, HMS

MassGeneral for Children

Learning Points

- ✓ **Bilious vomiting in the newborn must always be considered a surgical emergency.**
- ✓ **The ‘quiet’ between episodes of abdominal pain in infants and toddlers with intussusception can mislead the clinician. Remember lethargy can be a symptom of intussusception.**
- ✓ **When evaluating abdominal pain in the male, the abdomen extends from the upper thighs to the lower chest (always remember to examine genitalia for hernias and testicular problems).**
- ✓ **The etiology of severe lower abdominal pain in the postmenarchal female can be very difficult to diagnose. Many times, imaging studies (particularly ultrasound) will be needed to establish whether this is a medical or surgical problem.**
- ✓ **New onset of a chronic cough or ‘asthma’ in a toddler, particularly after an episode of choking, may be a foreign body, and imaging studies may not be helpful.**

Case-based surgical problems seen in the primary care setting

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Thinking about the new onset of vomiting in newborns and infants

A. The quantity of the vomiting is the most important factor.
B. The color of the vomitus is the most important factor in determining management.
C. A problem that rarely is associated with surgical problems.
D. Always needs imaging studies.

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Aspirated foreign bodies in children

A. Are almost always radio-opaque.
B. Chest films and fluoroscopy may be normal even if a foreign body is present.
C. CT scans of the chest should be the first imaging study.
D. Rarely are symptomatic.
E. Should be treated with postural drainage and chest physical therapy.

Testicular torsion

A. Only occurs in adolescence.
B. Surgery in the first 36 hours is associated with a high salvage rate.
C. Manual detorsion may injure the testis and should not be performed unless specialty trained.
D. Is a surgical emergency and imaging studies may not be necessary.

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The average annual risk for a pediatrician to be named in a malpractice suit falls in

A. **The upper third of all medical specialties at risk**
B. **The middle third of all medical specialties at risk**
C. **The lower third of all medical specialties at risk**

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Inguinal hernia in the pediatric patient

A. Rarely is associated with incarceration.
B. Rarely has serious complications.
C. Is more likely to incarcerate in adolescence.
D. Is more likely to occur in the premature infant.
E. Only occurs in male patients.

Case-based surgical problems seen in the primary care setting