Evaluation of the Acute Abdomen

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Acute Abdomen

- **10% of emergency room visits**
- **40% d/c with diagnoses: unknown etiology**
- **60% d/c with wrong diagnoses**
- **Acute vs. chronic pathology**
- **Atypical presentations most difficult**

The Acute Abdomen

- **Any Abrupt Onset of significant abdominal pain**
- **Requires urgent decision, diagnoses, and treatment**
- **Treatment is often surgical**
- **Diagnoses often unclear, but treatment must be appropriate**

Pathophysiology of Pain

- **Somatic Pain**
  - ✓ **Segmental spinal nerves**
  - ✓ **Pressure, inflammation, distention**
- **Visceral pain**
  - ✓ **Sympathetic, parasympathetic or somatic**
- **Referred Pain**
  - ✓ **IE Kehr's sign**

Patient Evaluation

- History of Present Illness
- Pain description, Assoc sxs, gyn/gu hx
- PMHx, Fam hx, Soc Hx
- PE
- Special Abdominal Focus
- Work up: Basic then Advanced
- "When you hear hooves its horses!"

Associated Symptoms

- Nausea, vomiting
- Fever, chills
- Anorexia, Weight loss
- Food intolerance
- Constitutional symptoms
- Change in Bowel habits
- GU symptoms

Description of Pain

- Onset and duration
- Character and severity
- Location and radiation
- What makes it better/ What makes it worse
- Progression of Pain
- Associated Symptoms

Gynecological / GU Symptoms

- Last Menses
- Sexual History/ Contraception
- Obstetric History
- Vaginal Discharge/ pain
- Dysuria, frequency
- Pneumaturia, hematuria

Past Medical History

- Previous GI disease or treatment
- Cardiac or Pulmonary Disease
- Medications
- Other Systemic Illnesses
- Recent Unassociated Illnesses
- Trauma

Physical Exam

- General Appearance
- Vital Signs
- HEENT
- Chest/CV
- Abdomen (Look, Listen, Feel)
- Gyn / rectal / GU
- Extremities / neuro/psych

Family and Social History

- Gastrointestinal Disease (ie IBD)
- Other familial Disorders
- Cancer
- Travel
- Environmental Exposure (include food)
- Drugs and Alcohol
- Illness of household contacts

Abdominal exam: LOOK

- Distention
- Breathing, splinting
- Discoloration
- Scars
- Hernias

Abdominal exam: LISTEN

- Percussion
- Auscultation
- Bowel Sounds
  - ✓ Presence
  - ✓ Character
  - ✓ Frequency

Work up: Basics

- CBC, Lytes, UA
- Abd Xrays (KUB, CXR, upright)
- other labs: Amylase, LFT's, HCG
- EKG

Abdominal exam: FEEL

- Localized tenderness
- Abdominal vs. flank or CVA
- Masses
- Hernia
- Ascites
- Peritoneal Signs
  - ✓ Guarding, rebound, referred rebound

Workup: Advanced

- Ultrasound: Pelvis/RUQ
- Computerized Tomography
- NG tube (also may be treatment)
- Endoscopy, UGI, contrast enema
- Laparoscopy and laparotomy

Etiology

- Appendicitis
- Cholecystitis
- Diverticulitis
- Perforated ulcer
- Pancreatitis
- Perforated bowel
- Bowel obstruction
- Mesenteric ischemia
- IBD
- Ectopic pregnancy
- PID
- Gastroenteritis
- Nephrolithiasis

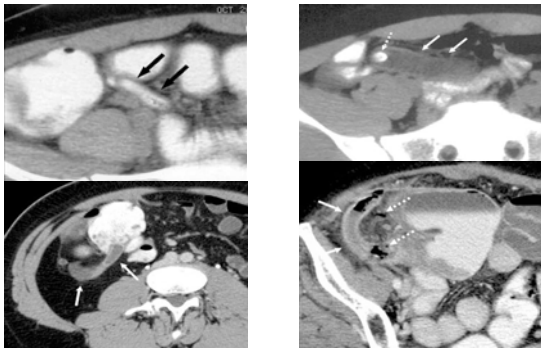
Appendicitis

- History: periumbilical pain migrates to RLQ anorexia, short time course
- Exam: tenderness in RLQ, -pelvic, Rovsing's sign, Psoas, obturator, referred rebound
- CT or US may be helpful

Other Causes

- Volvulus
- Cholangitis
- Pneumonia
- MI
- Ovarian pathology
- Hepatitis
- Sickle cell disease
- DM ketoacidosis
- Uremia
- Hypercalcemia
- porphyria
- intussusception
- lupus
- HIV
- Others

Appendicitis



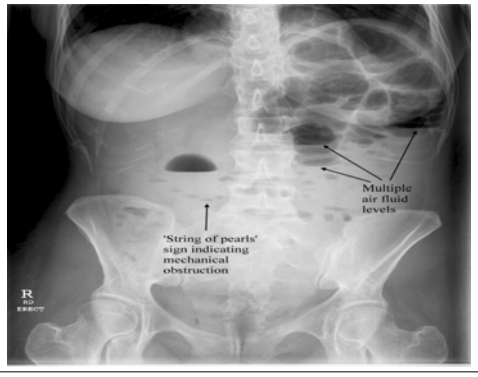
Small Bowel Obstruction

- History of surgery--adhesions
- Crampy pain, vomiting, obstipation
- Xrays often diagnostic
- Causes:
  - ✓ Adhesions
  - ✓ Hernia
  - ✓ Neoplasm
  - ✓ Intussusception

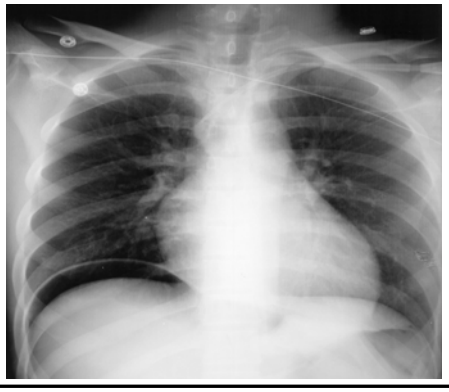
Perforated Ulcer

- History: PUD, NSAID's, other illness
- Free air on Abd Xray
- Generalized Peritonitis
- Most patients have no previous ulcer history

Small Bowel Obstruction



Free Air



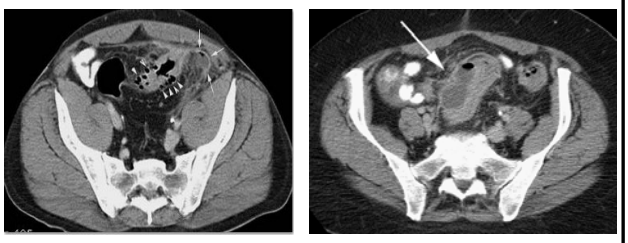
Diverticulitis

- History: Constipation, LLQ pain,fever, diarrhea prev hx of diverticulitis.
- Exam: LLQ tenderness, +/-
- CT is diagnostic
- Mostly non operative Rx,
- Surgery for perf, free fluid, antibiotic failure
- Abscesses need drained (by CT)

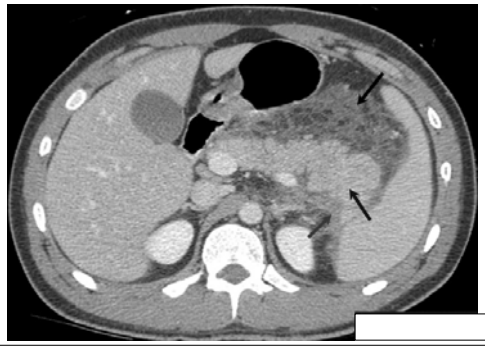
Pancreatitis

- History: gallstones, ETOH , pain radiating to back
- Exam: Generalized tenderness, ?peritonitis
- Amylase elevated (>200-5000)
- False elevations in SBO, perforation, ectopic, parotitis,
- US for stones, CT to evaluate panc

Diverticulitis



Pancreatitis



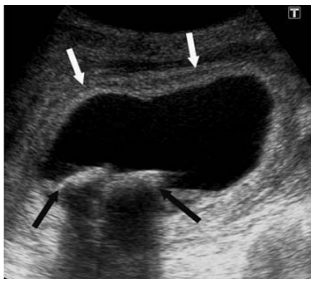
Cholecystitis

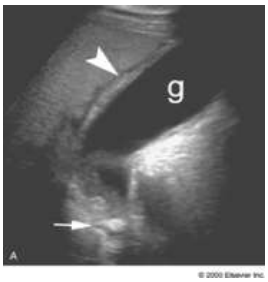
- History: post prandial RUQ pain, recurrent episodes, ~30% present with acute attack
- Exam: RUQ tenderness, +/- jaundice, fever, Murphy's sign
- Labs: amylase, LFT's, WBC, lytes
- US: stones, thickened GB wall, Fluid
- RX: cholecystectomy, antibiotics

Gastroenteritis

- History: Widely varied, diarrhea, vomiting, crampy pain, not localized, household contacts, previous history
- Exam: +/- fevers, diffuse tenderness, tender but not peritonitis,
- RX: IVF, bowel rest, observation

Cholecystitis





Pelvic Inflammatory Disease

- History: sexually active women, previous STD, vag discharge, dysuria
- Exam: Cervical motion tenderness,vag discharge, +\- adnexal mass(R\O TOA)
- Labs: WBC, UA, HCG
- US may be helpful
- IV antibiotics, observation

Mesenteric Ischemia

- History: chronic intestinal ischemia, cardiac arrhythmias, ASCVD, smoking, low flow, hypercoagulable state.
- Exam: Pain out of proportion to exam.
- Labs: WBC, amylase, lactate
- Abd x-rays: “thumb printing”

Ectopic Pregnancy

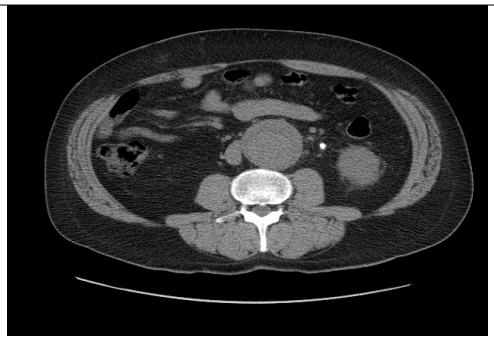
- History: Pregnant, menstrual irregularity,complete sexual history
- Exam: Shock, Adnexal mass, LQ tenderness
- Labs: Pos. HCG
- US may be diagnostic, fast, available
- RX: Operative

Mesenteric Ischemia


Ureterolithiasis

- History: flank pain, hematuria, radiation to groin, previous hx.
- Exam: restless, significant pain, no abd tenderness.
- Labs: UA, crystals, RBC. Normal WBC
- IVP, CT
- Hydration, pain control

Ureterolithiasis



The Acute Abdomen: A pediatric surgeon's view

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Pitfalls

- **Old age, young age**
- **Immunocompromised pt**
  - ✓ **HIV, steroids, ? Diabetes**
- **Compromised exam**
  - ✓ **Spinal cord injury, mental status**

Definition of Acute Abdomen

- ✓ **Development of an acute abdominal condition requiring urgent therapy (generally surgical)**
- ✓ **Pain of more than 6 hours duration is often surgical in nature (Cope's textbook)**
- ✓ **Pediatric population generally defined as age<18**

Etiology of Acute Abdomen in Children

- Acute appendicitis
- Meckel's diverticulum
- Intussusception
- Necrotizing enterocolitis
- Small bowel obstruction
- Blunt abdominal trauma
- Child Abuse (special topic)

Appendicitis

- Most common surgical emergency for pediatric surgeons
- Possibly more common in western societies
- Peak incidence in 2nd decade of life (age 11 through 20)
- "The great imitator" can be confused with other diseases

Diagnosis of Acute Abdomen

- Worsening or diffuse abdominal pain
- Abdominal distention
- Signs of shock/dehydration (late)
- "Backwards" syndrome of infants with peritonitis:
  - ✓ Hypothermia instead of fever
  - ✓ Apnea instead of tachypnea
  - ✓ Low WBC instead of high WBC

Differential Diagnosis

- Gastroenteritis
- Urinary tract infection
- Mesenteric adenitis
- Pneumonia (right lower lobe)
- Meckel's diverticulum
- Inflammatory bowel disease

Appendicitis

- **"Acute:" appendix is inflamed but intact. Illness duration < 1day**
- **"Gangrenous:" appendix is inflamed with necrosis of the appendiceal wall**
- **"Ruptured:" appendix is inflamed with rupture of the appendiceal wall and spillage of infection into abdomen**

Acute Appendicitis

Classic symptoms:

- **Anorexia**
- **Nausea**
- **Mild abdominal pain of gradual onset**
- **Pain gradually becomes more pronounced in the right lower quadrant and persists**
- **Low grade fever**

Appendicitis - Diagnosis

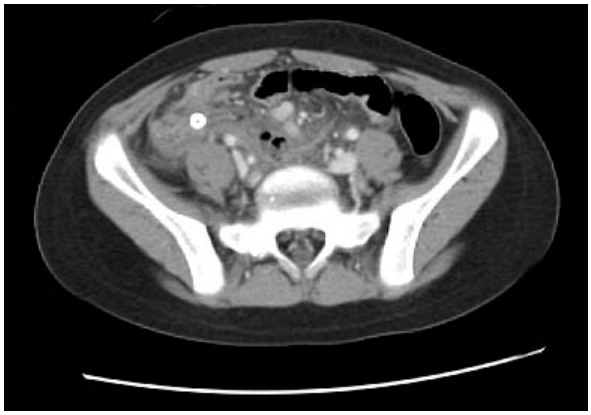
- **Rule: A careful history and a thorough physical examination are the keys to making the diagnosis of appendicitis**
- **Rule: You can't CT scan every child who walks into the emergency department with abdominal pain**

Acute Appendicitis

Classic physical examination findings:

- **Right lower quadrant abdominal tenderness**
- **Referred tenderness**
- **Easily reproducible examination**
- **Mild tachycardia**
- **Low grade fever – patient often looks flushed**

Acute Appendicitis



Appendicitis – Gangrenous

Symptoms

- **Usually ill > 48 hours**
- **Usually fever > 101.5**
- **Frequent vomiting, generalized abdominal pain**
- **Generalized abdominal tenderness**
- **May appear dehydrated**

Appendicitis – Perforated

Physical examination

- **Patient appears ill and dehydrated**
- **Vomiting, “diarrhea”**
- **Generalized abdominal tenderness**
- **may have signs of shock – can require significant fluid resuscitation**
- **May have bowel obstruction at presentation**

Ruptured appendix with multiple abscesses

Appendicitis - Ruptured

- IV fluids: 20 ml/kg normal saline bolus (may repeat)
- Antibiotics: gentamicin and clindamycin
- Foley catheter
- NG tube (if signs of bowel obstruction)
- Variety of operative approaches

Appendicitis - Treatment

- NPO
- IV fluids
- IV antibiotics
- Acute: appendectomy (laparoscopic vs. open)
- Gangrenous: appendectomy (laparoscopic vs. open)

Gastroenteritis

- Generalized abdominal pain - crampy
- Non-tender abdomen
- Either vomiting or diarrhea *must* be present
- Exposure to infectious source (ill sibling, contaminated food exposure, camping trip, foreign travel)

Diarrhea

- **Diarrhea refers to frequent *high volume* watery stool output**
- **Some patients with ruptured appendicitis will complain of diarrhea**
- **Many of these patients are having rectal irritation from peritonitis or pelvic abscess leading to rectal spasms and frequent *low volume* bowel movements**
- **A careful history is important**

Meckel's Diverticulum

- **A bleeding Meckel's diverticulum usually presents as painless lower GI hemorrhage which may be massive**
- **A perforated Meckel's diverticulum may mimic advanced appendicitis**
- **Occasionally presents as bowel obstruction**

Meckel's Diverticulum

The disease of "two's"

- **Lesion present in 2% of people**
- **Two feet from the terminal ileum**
- **Two mucosa types (gastric and intestinal)**
- **Two common surgical problems**
  - ✓ **Perforation**
  - ✓ **Bleeding**

Meckel's Diverticulum

Imaging

- **Due to the presence of gastric mucosa, the lesion can be found on a nuclear medicine scan fairly easily**

Treatment

- **Operation involves excision with primary anastamosis**

Intussussception

- **Telescoping of intestine onto itself causing obstruction**
- **Most common type is idiopathic (no known cause)**
- **Typical age group is 3 months to 3 years**
- **Episodic pain with minimal symptoms in between**
- **Infants may be lethargic**

Meckel's diverticulum with small bowel obstruction

Intussussception

Diagnosis and Treatment

- **Barium Enema: historical, not used anymore due to risk of perforation**
- **Ultrasound: "target sign"**
- **CT scan: multilayered mass (caution: transient, asymptomatic intussusceptions can also be seen on CT scan)**

Intussussception

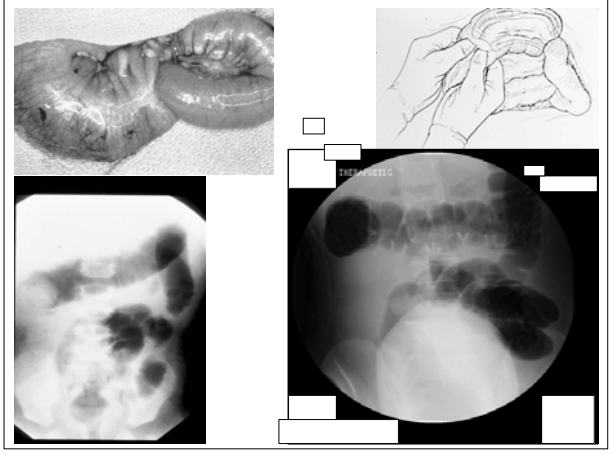
Air Contrast enema

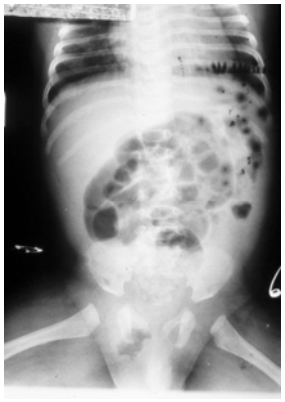
- **Diagnostic**
- **Therapeutic**
- **Low risk of perforation**
- **Standard of Care**
- **Generally performed by pediatric radiologists only**

Small Bowel Obstruction

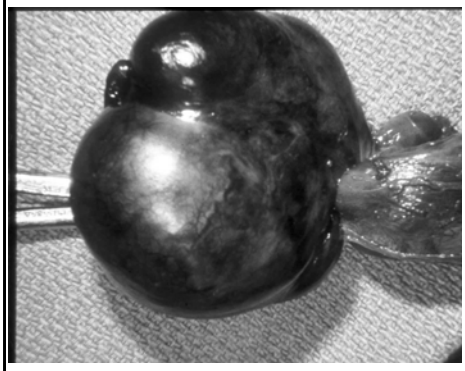
Etiology

- **Congenital**
  - ✓ **Malrotation**
  - ✓ **Inguinal hernia**
- **Post-operative**
  - ✓ **Any abdominal operation**
  - ✓ **VP shunt**
  - ✓ **Nissen – danger (difficult to diagnose)**





Small bowel obstruction in an infant due to an incarcerated right inguinal hernia



Strangulated bowel obstruction due to inguinal hernia in an infant

Necrotizing Enterocolitis (NEC)

A common cause of acute abdomen in the NICU but rare in the rest of the world

- ✓ Leading killer in NICU's across the United States
- ✓ Primarily infectious process
- ✓ Etiology poorly understood
- ✓ Often rapidly progressive
- ✓ Rare in full term infants (but seen occasionally in infants with cardiac disease)

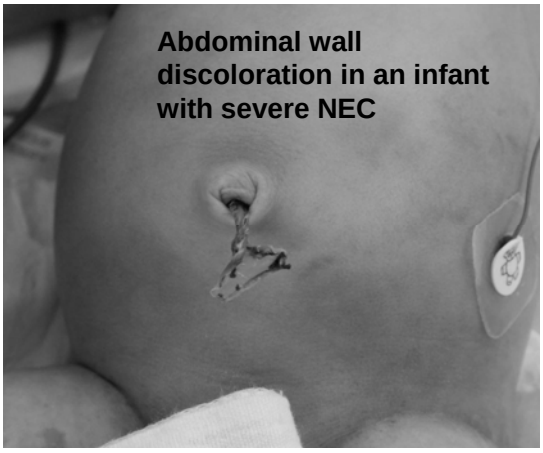
Small Bowel Obstruction

Nissen Fundoplication patients

- May have developmental delay
- Often have a gastrostomy tube
- *Usually cannot vomit!*
- SBO can be difficult to diagnose
- May have "closed loop" obstruction
- May need urgent exploration

Necrotizing Enterocolitis (NEC)

- Most cases are diagnosed in the NICU or special care nursery
- Patients at risk are profoundly premature or have significant cardiac disease
- Not present at birth but occurs within the first few days of life



Blunt Abdominal Trauma

- **Children are more susceptible to intra-abdominal injuries due to blunt trauma than adults because:**
  - ✓ **Thinner abdominal wall**
  - ✓ **Less fat around solid organs**
  - ✓ **More flexible rib cage**
  - ✓ **Higher risk behaviors?**

Child fell off bicycle – note handlebar mark in right lower quadrant

"Seat belt sign"

Each of these children had major intra-abdominal injuries

Blunt injury to colon with perforation and peritonitis

Child Abuse – special topic

- **#1 injury-related killer of children at NCH for the last 3 years**
- **A "silent epidemic" of major proportions**
- **Patients often have multisystem injuries**
- **Patients often make multiple visits to multiple EDs or clinics**
- **Patients may show up in your office with unrelated complaints**

Child Abuse

- 90% of children who experience physical abuse are injured by age 3
- The vast majority of children who are intentionally injured are injured by a caregiver (mother, father, boyfriend, babysitter), NOT a stranger
- Failure to recognize abuse on an ED visit can be fatal

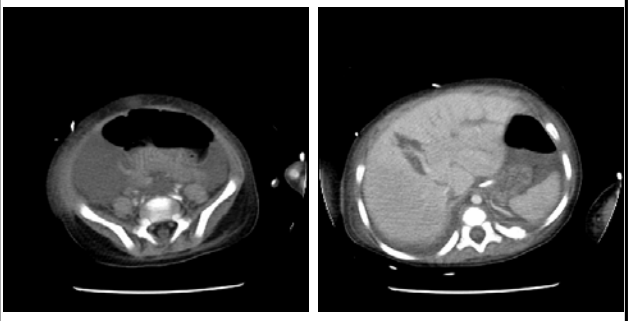
Child Abuse

- Beware of history that does not make sense or changes
- Beware of injuries blamed on too-young siblings
- Beware of young child with multiple ED visits for injuries
- Child Abuse can happen in a family of any race, ethnicity, or socioeconomic background

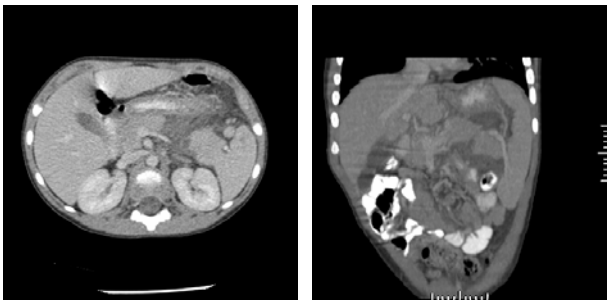
Child Abuse

Common "histories" in child abuse cases:

- Injury history
  - ✓ Child fell off a couch
  - ✓ Child fell on a toy
  - ✓ Child injured by a very young sibling
- Non-specific history
  - ✓ Infant has been fussy for hours
  - ✓ Infant refuses to eat
  - ✓ Infant "passed out" at home



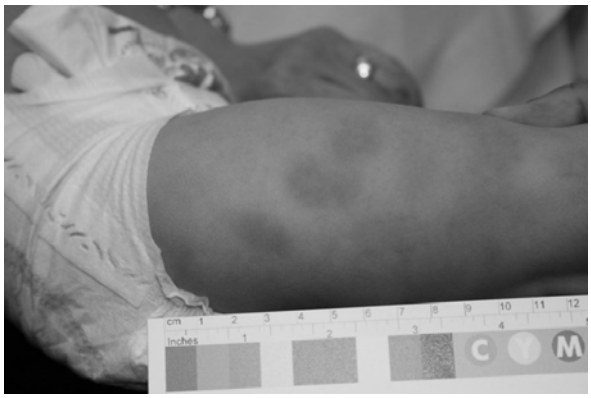
Hemoperitoneum and liver laceration due to blunt trauma (intentional injury)



Pancreatic transection in 4 year old
(blunt trauma - intentional injury)

Child Abuse

- All suspected child abuse cases should be referred to a pediatric trauma center
- These children usually need skeletal survey, eye exam, social work interview, exam by child abuse specialist
- Siblings in the home should be examined as well



Characteristic bruises in a child abuse victim

Conclusions

- Acute abdomen in children can be due to infectious disease or trauma
- Shock can be difficult to diagnose in children with acute abdomen
- Standard initial management includes IV hydration, antibiotics
- Many of these patients may deserve transfer to a children's hospital

The End