## DISCLOSURE

Thomas M. Krummel, MD

<table>
<thead>
<tr>
<th>Current Company</th>
<th>Role</th>
<th>Received</th>
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<tr>
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<td>BOD</td>
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<td>EarLens</td>
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None are relevant
OBJECTIVES

- Discuss initial presentation, work up, surgical intervention, and post operative care of:
  - Umbilical Defects
  - Inguinal hernias
  - Pyloric stenosis
  - Intussusception
  - Acute Appendicitis

- Discuss long term outcomes
UMBILICAL DEFECTS

- Umbilical hernia
- Gastrochisis/Omophalocele
- Omphalomesenteric duct
  - Fistula, sinus, cyst
- Urachus
  - Fistula, sinus, cyst
- Umbilical granuloma
- Omphalitis
UMBILICAL GRANULOMA
UMBILICAL GRANULOMA

- Physical exam
  - Drainage?
  - Opening?
- Abdominal wall U/S
- No remnants identified
  - Silver nitrate in clinic
  - Refractory: surgical excision
URACHAL REMNANTS
URACHAL REMNANTS

- Urachal cysts
  - Can become infected
  - Drainage and excision
- Patent urachus below the umbilicus

**TABLE 72-2** Tumors Arising from the Urachus

- Adenocarcinoma
- Transitional cell carcinoma
- Squamous cell carcinoma
- Mucinous (cyst) adenocarcinoma
- Malignant fibrous histiocytoma
- Fibrosarcoma
- Pleomorphic sarcoma
- Yolk sac tumor
- Inflammatory pseudotumor
- Villous adenoma (premalignant)
UMBILICAL HERNIA

- Observation: most close by 4 years of age
- Complications: None, unless incarceration
- Indications for Surgery:
  - Persistence > 4 years
  - Large (>2 cm) defects
INGUINAL HERNIA
EMBRYOLOGY

- Failure of the processus vaginalis to close
- Intra-abdominal testis migrates during 7th-9th month
- Females: canal of Nuck (labia majora), closes on the 7th month
INCIDENCE

- 0.5-5%
- Premies: up to 25%
- M-F 4:1
- 60% right sided
- 10-20% bilateral
- 12% family history
H&P FINDINGS

- Observe, Palpate, Transilluminate
- Thickened cord structures in the inguinal canal
- More visible with crying, straining
- Radiology: Ultrasounds may be used, but H&P is diagnostic in the vast majority of cases
EMERGENCY CARE

- Incarceration: 15%
- Fussy, inconsolable, vomiting, abdominal distention
- Occurs most frequently in the first 6 months of life
- Lower in premies
MANAGEMENT

- Repair soon after diagnosis (next available...)
  - Premies: repair before discharge
- Anesthesia: general
- Premies < 50-60 weeks old: Overnight stay
- Incarcerated
  - Try to reduce in males
  - Males: urgent
  - Females: ASAP
POST OPERATIVE CARE

- Outpatient Surgery unless secondary diagnosis warrants observation
- Pain managed by non steroidal analgesia
- Children may return to school within 1-2 days and full activity in 2-4 weeks
PYLORIC STENOSIS
HYPERTROPHIC PYLORIC STENOSIS

- The circumferential muscle of the pyloric sphincter becomes hypertrophied.

- Elongation and obliteration of the pyloric channel.
A FEW FACTS ...

- 2-8 weeks of age
- Acquired
- Boys 5:1
- 1-4:1000 births
- Both the muscle and the mucosa are thickened
- Etiology
  - Family history
  - ABO
  - Environmental
CLINICAL MANIFESTATIONS

- Onset of persistent, progressive and forceful non-bilious vomiting
- Dehydration (metabolic alkalosis)
- Palpable, hard, mobile and non-tender “olive” shaped mass in the epigastrum to the right of the midline - best palpated after the infant has vomited
- Well-appearing to acutely ill
- Weight loss or no weight gain common
- Persistent hunger despite emesis
DIAGNOSTIC IMAGING

- Ultrasound: elongated and thickened pylorus
- >16 mm in channel length and >4 mm in diameter
PRE-OPERATIVE MANAGEMENT

- Infant should have normal electrolytes, vital signs, and good urine output before proceeding to surgery
- Medical emergency/surgical urgency
  - NS bolus followed by D5 ½ NS + 20 KCL
  - Increased HCO₃ can cause POP apneas
TREATMENT: PYLOROMYOTOMY
POST OP CARE

- IV Fluids
- Strict I/Os
- Start feeds 4 hours post op
- Burp before and after feedings
- Some emesis is expected (although not as forceful or frequent), reassure will diminish over time
- Daily weights
- Treat pain with Acetaminophen
INTUSSUSCEPTION

S P E L L I T R I T E
INTUSSUSCESSION

- Telescoping of one of the intestinal segments (invaginates) into another portion resulting in a mechanical obstruction
- Causes impaired venous return, bowel ischemia, necrosis, and perforation
- Causes: Idiopathic, lead point, postoperative
- Commonly seen in children with Cystic Fibrosis and fecal impaction
- One of the most frequent causes of intestinal obstruction during infancy
A FEW FACTS ...

- More than 50% of all cases occur before the age of 1 year, 10-25% after age 2 years
- Most cases are idiopathic
- >4 years old: 60% have pathologic lead points
- Ileocolic: most common
CLINICAL MANIFESTATIONS

- Usually after a viral infection
- Sudden onset of severe, intermittent abdominal pain in healthy, thriving child
- Pain is paroxysmal, colicky and child appears comfortable between episodes
- Legs drawn up
- Bloody stools (red currant jelly-looking)
- Vomiting is reported in about 50% of the cases
- Fever
DIAGNOSIS
DIAGNOSI S

Intussusceptum
Intussuscipiens

Intussusceptum
Intussuscipiens
TREATMENT

➢ IV fluids, pain relief, NGT for decompression

➢ Barium enema (hydrostatic reduction) for reduction

➢ 80-90% successful

➢ Operation
  ➢ If unsuccessful
  ➢ Peritonitis
POST OP MANAGEMENT

- Admit for 24 hours after non-operative reduction due to risk of recurrence
- PO diet 4 hrs later
- Pain management
  - Re evaluate with U/S if too much pain or distention
- Risk of recurrence is 10%, 1-4% after surgical reduction, 0% after resection
LONG TERM OUTCOMES

- Excellent long term outlook even with recurrent episodes
- If tumor or systemic disease involved in the etiology of the intussusception, prognosis dictated by the underlying disease (i.e., Burkitt’s lymphoma, CF, HSP)
APPENDICITIS

- Most common condition requiring emergency operation
- Obstruction of the lumen of the appendix
- What happens??
  - Fecalith (appendicolith)
  - Hyperplasia of lymph tissue (after viral infection)
  - Foreign bodies or parasites
**HISTORY**

- Gradual onset of diffuse periumbilical or epigastric pain
- Loss of appetite
- Nausea/vomiting
- Pain localizes to RLQ and increases in intensity
- Bouts of diarrhea
- Fever (T >39 C) with peritoneal signs usually suggest perforation
PHYSICAL EXAM

- Motion tenderness
  - Peritoneal irritation
  - Pain with release of pressure

- McBurney’s Point
  - RLQ halfway between umbilicus and anterior superior iliac spine

- Psoas sign
  - Passive extension or flexion of leg, increase abd pain

- Obturator sign
  - Internal rotation of flexed thigh

- Rovsing’s sign
  - Pain in the RLQ during palpation of the LLQ
STAGES OF APPENDICITIS

- Simple
- Suppurative
- Gangrenous
- Perforated
- Abscess
DIAGNOSIS

- Elevated WBC (nonspecific)
- Increased neutrophils
- Urinalysis/ βHCG for adolescent patients
- Abdominal x-ray
  - Calcified fecalith?
- Ultrasound
  - Appendix diameter > 6 mm
  - hyperemia
- CT Scan of abd/pelvis
  - IV contrast
DIFFERENTIAL

- Gastroenteritis
- Constipation
- URI
- UTI
- Gastritis
- Intussusception
- Mesenteric adenitis
- Pneumonia
MANAGEMENT

Appendicitis?

U/S, if unclear: CT scan

Confirmed Dx

IVF and iv Antibx

Non perforated

Perforated
MANAGEMENT

Non Perforated

→ Lap appy

→ 24 hr stay
Regular diet
No antiBx
MANAGEMENT

Perforated

↓

IV AntiBx for 5 days

↓

Evaluate perc. drainage

↓

D/C home when:
Afebrile
Tolerating PO
Asymptomatic

Interval appendectomy in 6 weeks?
COMPLICATIONS

- Intra abdominal abscess
- Wound infection
- C Diff colitis
LONG TERM OUTCOMES

- Excellent
- Small number of patients develop late adhesive intestinal obstruction (0.68% after open appendectomy, 1.6-2% after perforated)
- Little evidence to support increased risk of tubal infertility
- Avoid leaving significant remnant of appendix to prevent recurrence
SUMMARY
PEDIATRIC SURGERY UPDATE

1. Common things are common.
2. Approaches remain evolutionary.
3. Application of minimal access tools/technology have been of real benefit.