Standardized Toolbox of Education for Pediatric Surgery

PYLORIC STENOSIS

APSA Committee of Education
2015
Pyloric Stenosis

• Author
  – Joseph A. Iocono, MD
    • Kentucky Children’s Hospital
    • University of Kentucky

• STEPS Editor
  – Kenneth Gow, MD
    • Seattle Children’s Hospital
    • University of Washington
4 week old male presents with a one week history of emesis.
History Discussion Slide

• What other points of the history do you want to know?
  • Color of emesis?
  • How much emesis?
  • Force of emesis
  • Fever?
  • Hydration status?
  • Weight loss?
  • Changes in formula?

• Bilious versus Non-Bilious
• Every feed? Percent of feed?
• On face, bib or across room?
• Any signs of infection?
• Number of wet diapers?
• Baby lost or stopped gaining wt?
• Any improvement with change?
History Discussion Slide

• What other points of the history do you want to know?
  • Color of emesis?
  • How much emesis?
  • Force of emesis
  • Fever?
  • Hydration status?
  • Weight loss?
  • Changes in formula?
  • Bilious versus Non-Bilious
  • Every feed? Whole feed
  • On face, bib or across room?
  • Any signs of infection? No
  • Number of wet diapers? Less
  • Baby lost half pound
  • No difference with formula change
Physical Exam

• **What specifically would you look for?**
  • **Appearance:** of the child – are there any concerns for dehydration, poor perfusion?

• **Relevant Exam findings:**
  • VS Temp 36.8, HR 165, BP 80/45, Sat 98% on RA
  • HEENT: sunken fontanelle, Lungs: CTA, Heart: RRR
  • Abdomen: distended, unable to palpate any masses, non tender
  • Ext: poor perfusion
Studies (Labs, Imaging)

• **Work-up?**
  – Need access for treat dehydration
  – Labs--Electrolytes, +/- CBC
  – 20 cc/kg bolus of NSS
  – Followed by D5 ½NSS c 20MeQ KCL/L at 1.5X maintenance rate

• **Radiology**
  – Ultrasound of pylorus
  – Look for enlarged pyloric muscle
    • Thickness > 4mm, Length > 15mm (might have local differences)
  – UGI-sometimes done
    • Shows complete gastric obstruction
Case Discussion

- **Diagnosis**
  - Pyloric Stenosis

- **Characteristics**
  - Hypochloremic, hypokalemic metabolic alkalosis
  - Paradoxical aciduria due to severe dehydration
  - Occurs 1:300 births, M:F = 4:1
    - Usually first born male
Interval steps before of surgery

• Correct Metabolic Alkalosis before Surgery
  – Timing of surgery is urgent
    • Done as soon as dehydration corrected
    • When? Bicarb <30 and Cl > 95
  – Why?
    • Anesthesia risks with metabolic alkalosis due to compensation with respiratory acidosis
    • With higher PCO2, infant will have difficulty extubating from anesthesia (central apnea)
Operation—2 choices

- **Laparoscopic or Open Pyloromyotomy**
- **Laparoscopic**
  - Patient position
  - Supine with baby at end of bed
- **Equipment**
  - 3 mm camera
  - 1 3mm port (umbilicus)
  - Pyloric knife or bovie with protected extended tip
  - 3mm bowel grasper
  - 3mm pyloromyotomy spreader
Laparoscopic pyloromyotomy

- **3 Incision option**
  - Umbilical incision (3mm)
    - Place port, insufflate to 8mm pressure with CO2
  - Right upper quadrant incision (3mm)
    - No port, place non traumatic bowel grasper
    - OR Geiger pylorus clamp
  - Left upper quadrant incision (3mm)
    - No port, place pyloromyotomy knife or Extended Bovie tip
    - Will exchange for spreader

- **Single incision option**
  - Umbilical incision
    - Single port, instruments through umbilicus

Harmon, C *Seminars in Peds Surg*, 2011, 20(4)
Pyloromyotomy Spreader
Laparoscopic Pyloromyotomy

**Procedure**

- Grasp pylorus

- Incise pylorus in between vein of Mayo to pyloric rim
  
  • From duodenal side to gastric side (Patient’s right to left)

- Use blunt tip of knife or cooled bovie tip to “wedge” into the second layer and begin the pyloromyotomy

- Exchange knife for spreader and open second layer of muscle to expose mucosa from vein of Mayo to pyloric rim.
Laparoscopic Pyloromyotomy

• Procedure (continued)
  – Once complete, check myotomy
  – 3 tests
    • Grasp both halves of cut muscle and see if they move independently
    • Insufflate air into stomach via OG tube (anesthesia) and check for mucosa bulging out without bubbles (leak)
    • Make sure air goes into duodenum to indicate obstruction relieved
Open pyloromyotomy

**Incision Choices**
- **Supra-Umbilical incision**
  - Undermine subcutaneous tissue
  - Open midline fascia
- **Right upper quadrant incision (2cm)**
  - Standard laparotomy opening

**Procedure**
- Deliver pylorus from incision
- Incise pylorus in between vein of Mayo to pyloric rim
- Use spreader to separate layer of muscle to expose mucosa from vein of Mayo to pyloric rim.
Post-operative issues

• Post-operative Care
  – Monitor x 24 hrs (A and B monitor, Sats)
  – Feed 2 hrs post-op
  – Pedialyte x 1, then formula or breast milk
  – Home 18-24 hrs usually

• Complications
  – Delayed feeding 10-15%
    • May be associated with degree of dehydration preop
  – Duodenal injury 0.5-1%
  – Infection 0.2%
1. What is the metabolic defect caused by the vomiting from pyloric stenosis is
   A. Metabolic Acidosis
   B. Metabolic Alkalosis
   C. Respiratory Alkalosis
   D. Urinary Alkalosis
Questions

1. What is the metabolic defect caused by the vomiting from pyloric stenosis is

A. Metabolic Acidosis
B. Metabolic Alkalosis
C. Respiratory Alkalosis
D. Urinary Alkalosis
Questions

2. What is best time to correct the defect in pyloric stenosis?
   A. Emergently, as soon as the diagnosis is made
   B. Elective repair, within a month
   C. As soon as correction of metabolic derangement
   D. None of the above
2. What is best time to correct the defect in pyloric stenosis?
   A. Emergently, as soon as the diagnosis is made
   B. Elective repair, within a month
   C. As soon as correction of metabolic derangement
   D. None of the above
3. The diagnosis of pyloric stenosis is confirmed best by
A. Physical Exam only
B. CT scan
C. Ultrasound
D. None of the above
Questions

3. The diagnosis of pyloric stenosis is confirmed best by
A. Physical Exam only
B. CT scan
C. Ultrasound
D. None of the above
Questions

4. Failure to correct Metabolic derangement before going to the OR increases risk of which complication?
   A. Leak
   B. Infection
   C. Failure to extubate after anesthesia
   D. Delayed tolerance of feeds
4. Failure to correct Metabolic derangement before going to the OR increases risk of which complication?

A. Leak
B. Infection
C. Failure to extubate after anesthesia
D. Delayed tolerance of feeds
Final Discussion/Review

1. Pyloric Stenosis is characterized by projectile non bilious vomiting in an infant 3-8 weeks of age without signs of infection

2. Severity of the dehydration is exhibited by metabolic alkalosis if dehydration is severe

3. Timing go Surgery is based on correction of metabolic derangement
Final Discussion/Review

4. Procedure is laparoscopic or open pyloromyotomy

5. Post-operative complications include infection and leak and delayed tolerance of feeds

6. Feeding may resume as soon as recovery from anesthesia complete
The preceding educational materials were made available through the American Pediatric Surgical Association.

In order to improve our educational materials we welcome your comments/suggestions:

www.eapsa.org