



# Pediatric Clips

**NURSING**

## *Hypertrophic Pyloric Stenosis*

by Linda Hollen, MS, CNP

September 2009 • Volume 5

Pediatric Nursing Clips by Pediatric Advanced Practice Nurses at Dayton Children's provides quick reviews of common pediatric conditions.

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### CASE STUDY

Miles is a 5-week-old male who presents to the emergency department (ED) with his parents. The parents report a several day history of projectile vomiting, despite changing his formula and beginning reflux medicine. The mother states he is always hungry and vomits after nearly every bottle. He has had no fever, diarrhea or constipation. She denies bilious or bloody emesis. Miles was born at term, weighing 7 lbs, 5 oz. Weight in the ED was 8 lbs, 3 oz. Until the recent onset of projectile vomiting, Miles has been healthy and achieving good weight gain. He received the Hepatitis B vaccine shortly after birth and is scheduled for immunizations at his next well check appointment.

Physical exam in the ED reveals a well nourished male infant in no distress. He is sleeping but arouses easily. His vital signs are normal. His anterior fontanel is soft and flat, not sunken. Mucus membranes are tacky but not dry. Heart sounds and lung sounds are normal. The abdomen is soft, not distended, nontender. There is no palpable abdominal mass.

A basic metabolic panel (BMP) and complete blood count (CBC) were ordered. Sodium and potassium were normal at 137 and 5.4 respectively. Chloride was low at 93 and CO<sub>2</sub> elevated at 30.8. The CBC was normal with no indicators of infection. Based on the history, physical exam and mild metabolic

alkalosis a pyloric ultrasound was ordered. The ultrasound showed the pyloric muscle to be abnormally thickened and the pyloric channel elongated to 18 mm. Pediatric surgery was consulted and Miles was admitted to the hospital for rehydration and surgery.

By morning the BMP had normalized. Miles was taken to surgery for pyloromyotomy. Six hours following surgery, his feeds were restarted and then advanced according to schedule. Approximately 24 hours later he was discharged home.

### CASE DISCUSSION

#### Definition and History:

Hypertrophic pyloric stenosis (HPS) is a condition of hypertrophy of the pyloric muscle causing narrowing of the pyloric sphincter leading to near complete obstruction of the gastric outlet from the stomach to the duodenum. HPS is the most common cause of gastric outlet obstruction in children.<sup>1</sup> Left untreated HPS can lead to forceful vomiting, dehydration and weight loss. Incidence is about one to three per 1000 live births. The male to female ratio is 4:1. It has been suggested, though not proven, that HPS affects the first born male more often. There is evidence of inheritance since 19 percent of males and seven percent of females born to women with a history of HPS will also have HPS. The incidence is much lower in the offspring of men with HPS.<sup>1</sup> The use of

oral erythromycin in infants under 2 weeks of age has been associated with HPS as has the use of macrolides by mothers late in pregnancy and while breastfeeding.<sup>2</sup> Gastric hyperacidity, hypergastrinemia and increased gastric vascularity in the infant may also be factors in developing HPS.<sup>2</sup>

HPS usually occurs in isolation, however a small percentage of infants with HPS will also be diagnosed with intestinal malrotation, obstructive uropathy or esophageal atresia. Jaundice is frequently noted but resolves after surgery and restarting feeds.<sup>1</sup>

#### Diagnosis

Classic presentation is an infant with nonbilious emesis following most feeds. Abdominal exam may reveal a palpable pyloric muscle in the right upper quadrant, often described as

an olive. Reverse peristalsis (left to right) may be noted across the abdomen as the stomach muscles attempt to force food past the obstruction.<sup>3</sup> Both are difficult to appreciate in a crying baby. Ultrasound is most commonly used to diagnose HPS, although an upper gastrointestinal (UGI) contrast study can also confirm the diagnosis. The pyloric channel will be narrowed and elongated. A thickened pyloric muscle and an elongated pylorus are diagnostic for HPS.

Evaluation for HPS also includes lab work. CBC and electrolytes will be measured to assess the degree of dehydration and metabolic alkalosis. Infants that have been symptomatic for several weeks will be hypochloremic from the loss of gastric hydrochloric acid.

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### Differential diagnosis

Overfeeding, gastroesophageal reflux (GER), elevated intracranial pressure and adrenal crisis can also present with nonbilious vomiting.<sup>1</sup>

### Treatment

The patient will be made NPO and IV fluids started. Pyloromyotomy is the definitive treatment for HPS. Pyloromyotomy is performed under general anesthesia once the infant's electrolytes are stable, often on the day of diagnosis. Surgical access to the pylorus can be either open or laparoscopic. Research has not shown a significant difference in operating time, the time to return to full feeds, or the hospital length of stay, between conventional open surgery or laparoscopic surgery.<sup>2</sup> Research has shown fewer episodes of emesis and fewer doses of analgesia with the laparoscopic method. With both techniques, the thickened pyloric muscle fibers are divided to relieve the

constriction and allow for normal passage of stomach contents into the duodenum. Duodenal perforation and wound infections are rare complications from this surgery.<sup>2</sup>

Feedings generally begin four to six hours postoperatively and are increased to full feeds over 24 hours. Nearly 80 percent of patients will initially have some post operative vomiting that gradually resolves.<sup>2</sup> Gastric emptying, as evidenced by radiological exams, does not return to normal until about one week following pyloromyotomy.<sup>1</sup> Follow up UGI and ultrasound remain abnormal for many weeks after surgery due to post operative swelling.<sup>2</sup>

### SUMMARY

Symptoms of HPS generally appear between three and five weeks of age. The typical patient presents with non bilious emesis and is hungry immediately fol-

lowing emesis. It is rare for HPS to be diagnosed in an infant over 12 weeks of age. Prognosis is excellent.

### REFERENCES

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## FEATURED NURSE SPECIALISTS



**LINDA HOLLEN, MS, CNP**, is the nurse practitioner for the division of pediatric surgery at The Children's Medical Center of Dayton. She

received her bachelor's degree in nursing from Wright State University. She

later graduated from Wright State University with a Masters of Science, Family Nurse Practitioner concentration. Linda works in collaboration with the five pediatric surgeons at Dayton Children's. She has been employed at Dayton Children's since 1990.

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