

Pediatric Emergency Ultrasound

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KEYWORDS

- Pediatric • Emergency medicine • Point-of-care ultrasound • Pyloric stenosis • Intussusception
- Skull fractures • Hip effusion

KEY POINTS

- Pyloric stenosis should be considered in infants 2 to 6 weeks of age with projectile emesis, and is diagnosed sonographically if muscle thickness exceeds 3 mm and pyloric channel length exceeds 15 mm.
- Intussusception is seen in young children with emesis and colicky abdominal pain, and can be diagnosed sonographically based on the presence of a target sign (transverse) and/or pseudokidney sign (longitudinal) most commonly seen in the right abdomen.
- Infants with head trauma and scalp swelling should be evaluated for an underlying skull fracture, which can be seen sonographically as a disruption in the hyperechoic linear bony cortex.
- Children with a limp or knee pain should be evaluated with ultrasound for a hip effusion, which is diagnosed sonographically if more than a 2 mm difference is seen in the anterior synovial space thickness between the symptomatic and contralateral hip, or if the thickness on the affected side exceeds 5 mm.



Videos of picture frame and lawnmower scanning of the abdomen for intussusception accompany this article at <http://www.ultrasound.theclinics.com/>

INTRODUCTION

The importance of point-of-care ultrasound (POCUS) in the daily practice of emergency medicine physicians is established and underscored by the comprehensive and well-cited guidelines from various emergency medicine organizations. The American Board of Emergency Medicine, American College of Emergency Physicians, Emergency Medicine Residency Review Committee, and Society of Academic Emergency Medicine have deemed POCUS a required core component

for training emergency medicine residents.^{1,2} That curriculum encompasses core applications that focus primarily on adult disease states, such as focused abdominal sonography in trauma, imaging in early pregnancy, aortic imaging, emergent cardiac imaging, and procedural imaging.³

POCUS is rapidly expanding to include pediatric-specific applications that aid in the diagnosis of pediatric clinical conditions and guidance of invasive procedures. Most pediatric emergency visits in the United States occur in hospitals that do not have a full spectrum of specialized pediatric

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Box 1**Clinical features of hypertrophic pyloric stenosis**

- Infant aged 4 ± 2 weeks
- Nonbilious emesis immediately after feeding
- Interested in eating
- Palpable “olive-like” mass in epigastrium
- Hypokalemic hypochloremic metabolic alkalosis

services.⁴ POCUS by emergency physicians has the potential for earlier diagnosis and expedited transfer to a facility that has specialized pediatric radiology and pediatric surgical services. This article highlights novel POCUS applications that focus on pediatric emergency care.

APPLICATIONS OF POCUS

Hypertrophic Pyloric Stenosis

Anatomy

The clinical features of hypertrophic pyloric stenosis are outlined in **Box 1**; however, the anatomy of the pylorus relative to other structures must be understood before the sonographic evaluation is performed.

The pylorus is located in the epigastrium, right (lateral) of midline at the end of the gastric outlet, posterior to the liver, and adjacent to or posterior to the gallbladder (**Fig. 1**).

Imaging protocols The superficial pylorus is best visualized with a high-frequency linear transducer. The examination may be performed with the

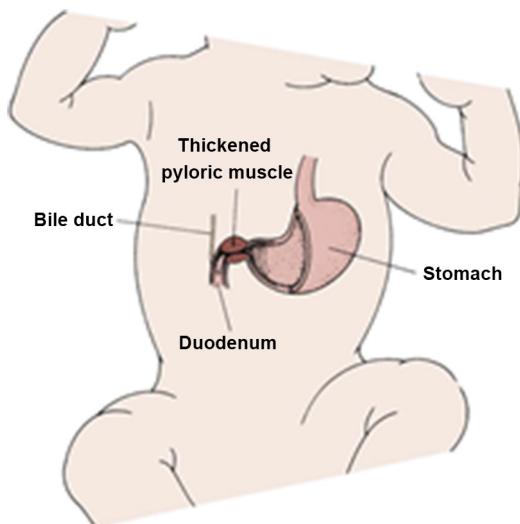


Fig. 1. Pylorus anatomic landmarks.



Fig. 2. Gastric antrum emptying into pylorus.

patient in the supine or right lateral decubitus position. Placement in the decubitus position will allow fluid to fall toward the most dependent area against the pylorus, which will provide a better sonographic window to visualize the pylorus and moves gas out of the way to the left side of the abdomen or stomach fundus.

If the stomach is too distended, the pylorus may be positioned posterior to the stomach. If the stomach is empty, the infant may be permitted to drink a small amount, which will allow the physician performing the POCUS to follow the flow of

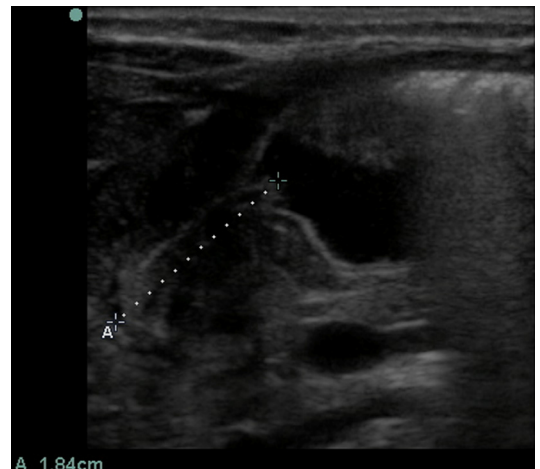


Fig. 3. Pyloric channel length measurement (A).

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