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Case Report

Imaging of Hypertrophic Pylorus Stenosis. About a Case

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Received: August 16, 2022; **Published:** September 23, 2022

Abstract

Hypertrophic pylorus stenosis is a disease caused by a hypertrophy of the pyloric musculature that causes a progressive blockage of gastric emptying. Its diagnosis is mainly clinical, imaging means are used in case of diagnostic doubt or when the disease is in the initial stage, considering the first-line ultrasound for its high sensitivity and specificity. Baryte studies of the upper gastrointestinal tract are considered of second choice, they are requested when abdominal ultrasound is inconclusive or the ultrasonography is not available. We suffered a patient in whom baryte radiography was very useful in defining the diagnosis and behavior to follow. This review is aimed at highlighting the value of imaging studies in the diagnosis of hypertrophic pylorus stenosis.

***Keywords**: Pyloric Stenosis; Pylorus; Vomiting; Pyloromyotomy; Ultrasonography; Pediatric Pathology*

Introduction

Hypertrophic pylorus stenosis is the decrease in intestinal lumen at the level of the pylorus due to hypertrophy of the muscular layer of the antro-pyloric portion of the stomach, which becomes abnormally thickened and manifests clinically as obstruction to gastric emptying [1].

Hypertrophic pylorus stenosis is the most frequent cause of abdominal surgery in infants under 2 months of age, as well as the main cause of metabolic alkalosis in pediatrics, which occurs as a result of vomiting gastric contents where anions and chlorine are lost. Mortality from untreated PHD is almost always due to shock from dehydration, mortality is rare after pyloromyotomy, long-term sequelae from surgical treatment are minimal [2].

The diagnosis of hypertrophic pylorus stenosis is based on the clinical picture of an infant with vomiting in a non-bilious projectile and an olive-shaped loop, palpable in the right upper quadrant during abdominal examination. The abdominal physical examination has been the main key to the diagnosis for decades, the palpation of the pyloric olive requires a calm infant at the time of the examination and could be impossible when the stomach is markedly distended, requiring a nasogastric tube for gastric decompression. The sensitivity varies widely depending on the experience of the examiner, the current trend is to perform radiological studies to determine the diagnosis [1,3].

Pyloric stenosis can be safely diagnosed on the basis of history and physical examination, with ultrasound used only as an auxiliary means. However, in certain cases where the story is strongly suggestive but the test is negative, ultrasonography may be crucial [3].

Imaging studies also include simple radiography of the abdomen and baryte studies of the upper gastrointestinal tract. These have been the subject of debate and an error rate is estimated between 4.5% and 11.1%; in addition to citing damage such as barium bronchoaspiration and exposure to ionizing radiation to a young child [1,3,4]. Ultrasonography, as a diagnostic aid method in hypertrophic pylorus stenosis, has proven to be a reliable method and sensitivity and specificity of up to 100% has been reported even in children with doubtful or normal physical examination [4,5].

Some authors recommend the baryte study of the upper gastrointestinal tract in vomiting infants with the same age range of hypertrophic pylorus stenosis when the index of suspicion for it is low since it is more effective to rule out other clinical situations such as malrotations or gastrointestinal reflux. It has even been pointed out that it is more effective when analyzing the cost-benefit ratio since a negative ultrasound is usually followed by this research while an ultrasound is rarely indicated after a baryte study of the negative gastrointestinal tract [1].

The imaging artist therefore plays a key role in the initial care of these children. It is important that the radiologist understands the anatomical changes of the pyloric canal reflected in the various imaging techniques, in infants affected by hypertrophic pylorus stenosis.

Case Presentation

Male patient of 35 days of age, from urban area, referred to our center because for 4 days he has been with immediate postprandial vomiting, not bilious, which becomes more and more frequent. The family denies previous vomiting episodes, with good tolerance to feeding (breastfeeding). Bowel habit and normal bowel movements. There is no weight loss and no decrease in appetite.

In the physical examination, an adequate weight for their age, good hydration and coloration of skin and mucous membranes were verified. On abdominal palpation a possible pyloric "olive" was not found, if discrete gastric distention is appreciated with normal hydroaerial noises, gastric tympanism to percussion, without vigorous gastric contractions.

Laboratory tests are normal for age ruling out the presence of hydroelectrolytic alterations and metabolic disorders. The abdominal x-ray shows gastric distention with decreased or absent gas in the intestine.

It was decided to perform an ultrasound, in which the sign of "the target" can be identified transversely by observing an echogenic mucosa surrounded by a hypogenic ring, longitudinal the sign "of the cervix". The size of the pylorus was reported as: total pylorus diameter greater than 15 mm and pyloric muscle greater than 4 mm or length greater than 16 mm.

It is striking in this patient that since admission, and after an adequate orientation to the mother on the technique of lactation, he had not presented more vomiting, it is decided and performs high gastrointestinal baryte study. This study is reserved for when ultrasound is inconclusive, as it represents a risk of bronchoaspiration, is expensive, involves radiation, consumes time, and is considered invasive. In addition, it has less sensitivity and specificity.

When performing the baryte x-ray, the radiological sign of "the rope" is initially found, given by the minimum amount of contrast that in the first moments crosses the canal, but then the opening of the pyloric canal is appreciated with a normal gastric emptying at 3 hours. No other congenital anomalies of the digestive tract were identified. Bad food technique and pyloric spasm were concluded as a diagnosis.

Figure 1: *On radiological examination followed by barium ingestion, with the patient in the right anterior oblique position to facilitate emptying, the pyloric canal appears and filiform, elongated and erectile.*

Figure 2: *After the initial x-ray or adequate gastric evacuation of barium excludes theistic diagnosis of pyloric stenosis.*

The patient was discharged within 24 hours without complications. It has been followed by consultation with a favorable evolution.

Discussion and Conclusion

Hypertrophic pylorus stenosis is a relatively common disease that affects children in the first months of lactation. It can often be safely diagnosed on the basis of history and physical examination only, with ultrasound used only as an auxiliary procedure. In certain cases, where the history is strongly suggestive but the physical examination is negative, imaging (ultrasound and/or x-rays of the upper tractus) may be crucial [1,3].

An increased reliance on imaging tests is observed. Today, due to the social development achieved, including education and accessibility to the health system, children do not present regularly in such an advanced state of the disease, which allows to demonstrate the classic clinical characteristics. The use of imaging studies to establish the diagnosis has become common practice; the result has been, in short, the diagnosis of hypertrophic pylorus stenosis before alkalosis develops, a shorter clinical course, less morbidity and a shorter postoperative hospital stay [3].

Some studies indicate that 10% to 50% of patients with hypertrophic pylorus stenosis have electrolyte disorders such as hypokalemia and hypochloremic alkalosis [6,7]. Hydroelectrolytic imbalance is one of the main causes of delay in surgery, since no patient with hydroelectrolyte alterations will be taken to the operating room. Currently due to the early use of ultrasound as a diagnostic aid in the presence of vomiting, the classic signs and electrolyte alterations of hypertrophic pylorus stenosis are observed less frequently [7].

Abdominal ultrasound is the study of first choice if it is suspected that it is hypertrophic pylorus stenosis. At the same time, it serves to rule out the presence of fenestrated duodenal membrane, or annular pancreas [8]. Ultrasound has a sensitivity of 98% and specificity of 100%, with a positive and negative predictive value of 100% and 90% respectively [9].

Abdominal ultrasound should report muscle hypertrophy of the pylorus. It is considered positive in the presence of: Total diameter of the pylorus greater than 15 - 18 mm or Thickness of the pyloric muscle greater than 3 - 4 mm or length greater than 17 mm or image of "double rail" by narrowing of the intestinal lumen [6,8,9].

Some authors consider that not everything is said about the measurements taken by abdominal ultrasound, which are used to establish the diagnosis, since they consider that these may differ if the age and weight of the infant are considered [1].

The ultrasonographic diagnosis of hypertrophic pylorus stenosis may be modified in the presence of: Pyloric spasm, fluid-filled duodenal bulb or abundant intestinal gas [1].

Occasionally, on simple X-rays of the abdomen, intragastric air will show dilation of the stomach, pyloric obstruction with imaging that mimics a peak, pyloric peak, and scarce or absent gas, beyond the pylorus [3].

The baryte study of the gastrointestinal tract is an effective means for the diagnosis of hypertrophic pylorus stenosis with sensitivity and specificity very similar to ultrasound, with the difference that this is an invasive diagnostic method, and the patient is exposed to radiation during the procedure. It is requested when ultrasound is inconclusive or there is atypical presentation of signs and symptoms [2,6].

The sensitivity and specificity of the o-duodenal esophagogastric series has been reported from: Sensitivity of 84 to 100%, specificity of 75 to 100%. It depends on the experience of the doctor conducting the study and the quality of the equipment [6].

The findings in the baryte study of the gastrointestinal tract that support the diagnosis are: Gastric distension, delay in gastric emptying, antiperistaltic wave that stops in the stomach, elongated pyloric duct of 2 - 3 cm and thickened that gives image of "double or triple rail", sign of the "shoulder" by accumulation of barium in the pre pyloric antrum which is dilated [6].

Observations in fluoroscopy include a vigorous peristalsis reminiscent of a caterpillar and with an abrupt stop in the pyloric antrum, with an impression observed in the antrum due to the hypertrophied muscle, a sign of the shoulder. Barium can be transiently trapped between the peristaltic wave and the muscle. The contrast pass through the redundant and hypertrophied mucosa will offer the sign of the rope or that of the double line [3].

In the normal study the prepyloric antrum is widely distensible between normal peristaltic waves and the thin pyloric ring can be seen communicating the prepyloric antrum and the duodenal bulb. Fluoroscopic observation is important because antral peristalsis can transiently simulate an elongated and abnormal canal [3].

Given the suspicion of hypertrophic pylorus stenosis in an infant, the imaging study that should be performed as the first choice is abdominal ultrasound. The esophageal-gastro-duodenal series is the study of second choice, it is requested when the abdominal ultrasound is not conclusive or the ultrasonography is not available [6].

Although upper gastrointestinal endoscopy would demonstrate pyloric obstruction, it is difficult to accurately differentiate between hypertrophic pyloric stenosis and pyloric spasm. Endoscopy is reserved for patients with atypical clinical signs, or when ultrasound and the esophagus-gastro-duodenal series are inconclusive [2,7].

The differential diagnosis in the presence of persistent non-biliary vomiting in newborns and minor infants comprises several entities. Poor food technique, polaric and spasm, and gastroesophageal reflux are the diagnoses with which this pathology can be confused most often, so it is recommended to perform an exhaustive interrogation, a complete physical examination and an accurate imaging evaluation to be able to differentiate them [2,10]. The importance of imaging evaluation should be highlighted. The responsibility is to determine as soon and as precisely as possible, the presence or not of the entity. The evolution of the child, without a doubt, passes, primarily, by our judgment [3].

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Volume 11 Issue 9 September 2022