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Case Report

Hypertrophic pyloric stenosis in a toddler: An atypical presentation in Obafemi Awolowo University Teaching Hospitals Complex, Ile-Ife, Nigeria

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ABSTRACT

Gastric outlet obstruction resulting from hypertrophic pyloric stenosis typically manifests in early infancy and seldom occurs after this period. The case is a 14-month-old toddler with multiple episodes of nonbilious, projectile vomiting with persistent hunger, and progressive weight loss for three weeks. The symptoms were preceded by ingestion of a water-based herbal concoction. His barium meal and abdominal ultrasonographic findings were diagnostic of hypertrophic pyloric stenosis (HPS), following which he had an initial pyloromyotomy, which failed before he later had pyloroplasty. The patient was subsequently discharged home four days after the second surgery and has remained stable since then.

Although hypertrophic pyloric stenosis is uncommon beyond early infancy, it should be suspected in toddlers with persistent postprandial vomiting that is projectile and nonbilious. Early diagnosis is essential to limit malnutrition as well as other complications associated with HPS.

Keywords: Hypertrophic, Pyloric, Stenosis, Toddler, Atypical

INTRODUCTION

Hypertrophic pyloric stenosis results from abnormal muscular thickening and luminal narrowing of the gastric canal.[1,2] The condition is relatively uncommon in girls relative to boys. Children who are administered erythromycin azithromycin and those with hypergastrinemia are at higher risk of this condition than the general population.[3,4] The condition commonly presents at the four to eight weeks of life.[1,5]

The condition usually manifests as nonbilious projectile vomiting that typically occurs shortly after feeding.[5] The affected infants are usually hungry immediately after vomiting. Palpation of an olive-shaped mass in the upper abdominal quadrant as well as the presence of a visible peristaltic wave is a common finding.[6–8] Late features of hypertrophic pyloric stenosis include evidence of wasting, dehydration, and metabolic alkalosis.[1,9] Hypertrophic pyloric stenosis is readily diagnosed by abdominal ultrasonography, showing characteristic signs of pyloric narrowing or obstruction. Barium studies and endoscopy are also useful if an ultrasonographic finding is inconclusive. Surgical management involves Ramsted pyloromyotomy,[10] while pyloroplasty is an alternative surgical modality.[11]

CASE REPORT

The patient is a 14-month-old boy who was noticed to have a body rash for two weeks; post which the mother gave some water-based herbal concoction whose content is unknown. The boy was subsequently noticed to be salivating excessively with postprandial projectile nonbilious vomiting about four times per day; the vomitus was initially blood-stained after repeated retching. There was frequent hunger with weight loss but no abdominal distension; bowel motion was infrequent as the illness progressed. The patient was born at term and has no history of similar complaints.

The patient presented in the second week after the onset of symptoms and was observed to be severely malnourished

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with a weight of 6.5 kg but had a normal length (weight-to-length was below the 3rd percentile). There were some papular rashes on the trunk but had no digital clubbing, no cyanosis, or significant peripheral lymph node enlargement and edema. The abdomen was flat with no palpable mass on examination. A digital rectal examination showed no abnormality. Intestinal obstruction was suspected, for which he had an X-ray with abdominal ultrasound, which was inconclusive. Although he had leukocytosis, the electrolytes with creatinine indices were within the normal limit on two occasions, and the retroviral screening was non-reactive. Antibiotics with intravenous fluid were given for suspected intra-abdominal infection.

The patient later had a barium meal that showed evidence of a grossly distended stomach, with abrupt luminal narrowing of the gastric outlet and the elongated pyloric canal in keeping with hypertrophic pyloric stenosis [Figure 1]. A repeat abdominal ultrasound showed hypertrophied hypoechoic pyloric muscle measuring 7.5 mm and 20 mm in thickness and length, respectively [Figure 2]. Following a review by a pediatric surgeon, he had pyloroplasty after an initially failed pyloromyotomy. The intraoperative finding was a thickened pylorus with a markedly dilated stomach. The patient commenced oral feeding a few hours after surgery and was discharged four days after the second surgery. The patient is gaining weight and has remained stable for several months.

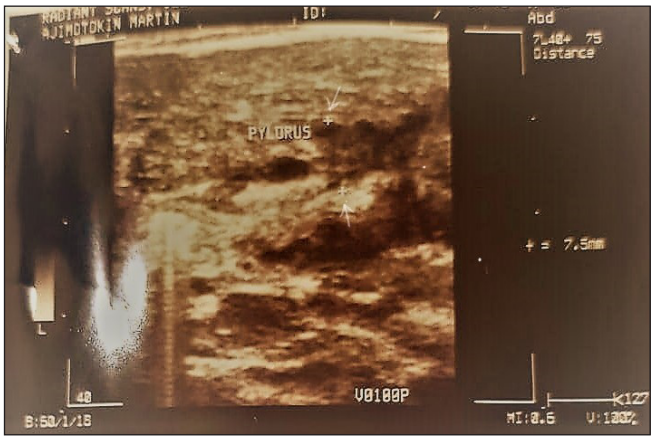

Figure 2: B-mode sonogram of the patient showing hypertrophied heterogeneously hypoechoic pylorus (upper +/arrow: upper margin of hypertrophied gastric pylorus; lower +/arrow: lower margin of hypertrophied gastric pylorus).

DISCUSSION

Cases of hypertrophic pyloric stenosis (HPS) occur in 2–5 persons out of every 1000 live births. Boys account for 80% of cases, and first-born individuals have the highest risk. The condition is more common in Caucasians than Black, Indian, and Asian populations.[1,12]

Hypertrophic pyloric stenosis is secondary to smooth muscle hyperplasia and hypertrophy of the pyloric muscular layers. The narrowing of the gastric antrum and the elongation of

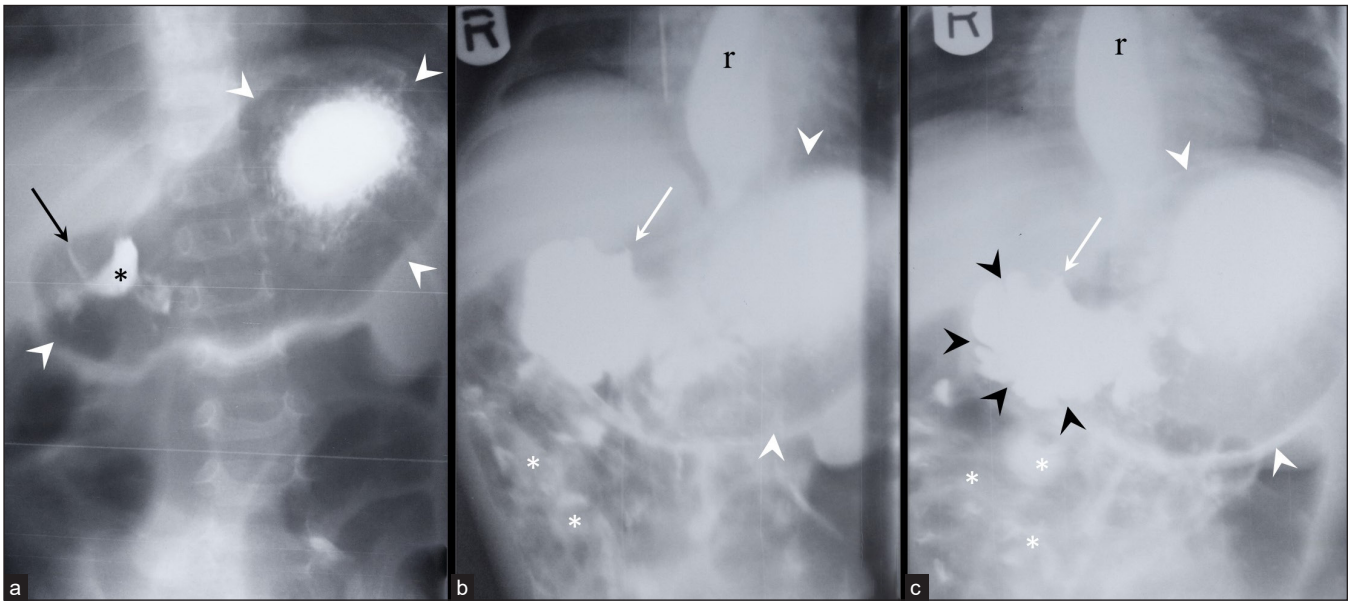

Figure 1: Single contrast barium meal in (a) supine anteroposterior view-early filling (b) right posterior oblique view–delayed image (c) supine anteroposterior view -delayed image. The stomach is grossly distended (white arrowheads in 'a, b, c's) with abrupt luminal narrowing at the gastric outlet, giving a positive 'beak sign' (white arrow in 'b,c'). There is associated elongation and narrowing of the partly demonstrated pyloric canal, providing a positive 'string sign' (black arrow in 'a'), while a lobulated gastric outline in the antral segment suggests an exaggerated peristaltic wave (black arrowhead in 'c'). The duodenal cap (black* in 'a'), Intestinal walls (white stars in 'b' and 'c') and features of gastroesophageal (r) are shown.

the pyloric canal result from the thickening of the circular and longitudinal muscles, leading to luminal obstruction.[2] In about 60–80% of affected infants, palpation of an enlarged olive shaped mass is observed in the upper quadrant of the abdomen;[6–8] however, no abdominal swelling was palpated in the reported case.

The etiology of hypertrophic pyloric stenosis is multifactorial, probably comprising genetic and environmental factors.[1,3–4,13–14] About 7% of infants of previously affected mothers develop HPS, suggesting a hereditary association. Allergy to cow milk protein, infantile hypergastrinemia, and abnormal myenteric innervation are probable environmental risk factors for HPS. Ingestion of macrolides such as erythromycin and azithromycin during the neonatal period has been reported to promote the development of infantile pyloric stenosis.[3–4] The use of bottle feeding has also been found to increase the incidence of hypertrophic pyloric stenosis.[13–14] Maternal heavy smoking during pregnancy tends to increase the risk of HPS by about twofold.[1] These factors are not contributory to the index report; however, the constituent of the ingested herbal concoction is unknown, making it challenging to ascertain the possibility of gastrin-inducing agents in the herbs.

In about 95% of cases of HPS, the condition is diagnosed between the ages of 3 to 12 weeks. Wolf *et al*. reported a rare hypertrophic pyloric stenosis in a 17-year-old girl in the United States of America. A similar case in India was also reported in an adolescent male who subsequently had pyloroplasty.[15–16] These atypical findings are similar to our reported case relative to the usual age of presentation. Typically, it manifests as an onset of non-bloody, nonbilious vomiting, which may be complicated by dehydration at about the 4-8 weeks of life.[1,5] Weight loss may ensue if there is a diagnostic delay.[1,5] The vomiting intensity increases until a projectile pattern occurs at almost every feeding. Similar to the reported case, another uncommon finding associated with pyloric stenosis is hematemesis, which is usually not severe; this could result from slight bleeding following a tear of gastric mucosa due to repeated straining.

Affected infants who have protracted vomiting may develop profound electrolyte imbalances. A common metabolic derangement associated with HPS is hypokalemic, hyperchloremic alkalosis.[9] Our case showed no feature of alkalosis, probably because of the older age at presentation when dehydration with electrolyte derangement may not be remarkable compared to young infants. Meanwhile, biochemical derangement occurs in less than 50% of HPS once the diagnosis is made early.[17]

The standard diagnostic modality for HPS is an abdominal ultrasonography scan (USS). However, the predictive value of the technique is a function of the ultrasonographer's expertise. An elongated pylorus and muscular wall thickness of ≥15 mm and ≥3 mm, respectively, are diagnostic of infantile pyloric stenosis.[16] It may also show *target* signs and a lack of gastric emptying. When USS is inconclusive, an upper gastrointestinal barium study is a reliable diagnostic technique; antral indentation from the hypertrophied muscle in addition to elongated pylorus are typical. Possible findings on barium studies include beak sign, string sign, double track sign, as well as "shoulder" sign that was observed in the reported case. The diagnostic sensitivity and specificity of abdominal X-ray is inferior. Upper endoscopy is useful when there is a diagnostic dilemma.[16] The clinical, radiological, and operative findings of the index patient among others.

Following the diagnosis of HPS, an immediate intervention involves the correction of fluid and electrolyte imbalances. Ramstedt pyloromyotomy is the gold standard surgical modality with excellent outcomes.[10] Pyloroplasty is an alternative surgical modality[11,15] following a failed pyloromyotomy, as observed in the index patient.

CONCLUSION

Hypertrophic pyloric stenosis is a rare but a possible cause of gastric outlet obstruction beyond early infancy. There is a need for a high index of suspicion of the condition in toddlers who present with persistent projectile and nonbilious vomiting. This will help to limit associated complications resulting from diagnostic delay.

Ethical approval

The Institutional Review Board approval is not required.

Declaration of patient consent

Patient's consent not required as patients identity is not disclosed or compromised.

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Conflicts of interest

There are no Conflicts of Interest.

Use of artificial intelligence (AI)-assisted technology for manuscript preparation

The authors confirm that there was no use of artificial intelligence (AI)-assisted technology for assisting in the writing or editing of the manuscript and no images were manipulated using AI.

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