

## Ultrasound of Hypertrophic Pyloric Stenosis: About A Case and Literature Review

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### Abstract

### Case Report

Hypertrophic pyloric stenosis is an obstruction of the lumen of the pylorus by muscular hypertrophy of the pyloric sphincter, more common in boys. We report the case of a male newborn at 13 weeks of life, born at term with a birth weight estimated at 2900 grams without any particular history. Clinically he had an increased frequency of sputum and postprandial jet vomiting, dehydration and weight loss. Abdominal ultrasound found a lengthening of the pyloric canal measuring 22 mm in length associated with a thickening of the muscularis of the pyloric region measuring 4 mm forming a "pyloric olive" 13 mm in diameter. There was also significant gastric stasis upstream of the hypertrophic stenosis. The examination was carried out at the reference health center of commune III in the district of Bamako. The objective of this work was to provide our experience on the ultrasound semiology of hypertrophic pyloric stenosis with a review of the literature.

**Keywords:** Pylorus; Hypertrophic stenosis; Abdominal ultrasound.

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## I. INTRODUCTION

Hypertrophic pyloric stenosis is an obstruction of the lumen of the pylorus by muscular hypertrophy of the pyloric sphincter. This hypertrophy extends to the wall of the prepyloric antrum, creating a tight progressive narrowing, antropyloric extending over several centimeters [1]. It affects 2 or 3 children out of 1000 and is a frequent cause of vomiting in infants, with a male predominance. It most often occurs between 3 and 6 weeks of life and rarely after 12 weeks [2]. Its pathogenesis is poorly known to date. Abdominal ultrasound is the reliable, easiest and fastest way to confirm the diagnosis [1]. The aim of our work

was to provide our experience on the ultrasound semiology of hypertrophic pyloric stenosis with a review of the literature.

## OBSERVATION

We report the case of a male newborn at 13 weeks of life, born at term with a birth weight estimated at 2900 grams. No family history or notion of taking antibiotics early. His clinical picture was marked by an increase in the frequency of postprandial sputum and vomiting qualified as a jet, dehydration and weight loss. Upon inspection, we observed peristaltic ripples (Figure 1).



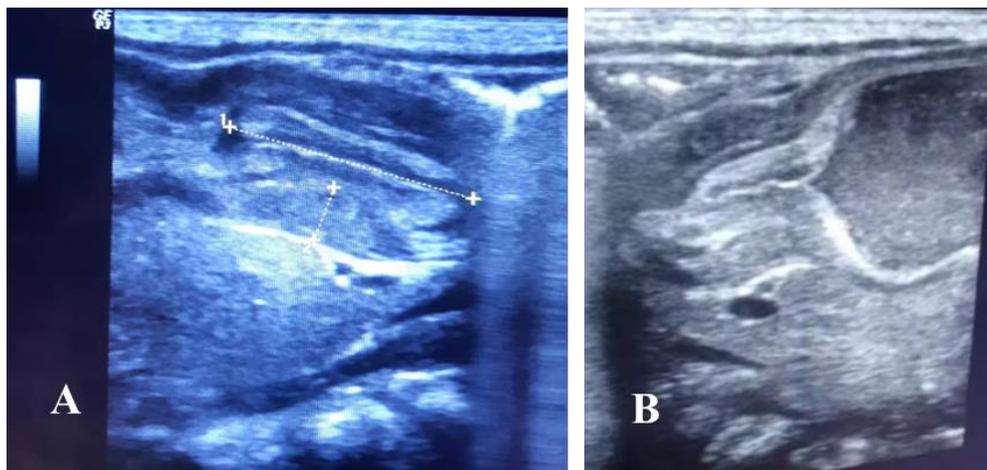
**Figure 1: Newborn photo showing peristaltic ripples**

Abdominal ultrasound performed by a Mindray brand color doppler ultrasound device equipped with two convex and linear probes commissioned in 2010 at the level of the reference health center of commune III of the district of Bamako in Mali, had put in evidence of elongation of the pyloric

canal measuring 22mm in length associated with thickening of the muscle of the pyloric region measuring 4mm forming a "pyloric olive" 13mm in diameter. There was also significant gastric stasis upstream of the hypertrophic stenosis (Figure 2 & 3).



**Figure 2 (A, B and C): Cross-sectional abdominal ultrasound showing a target appearance: the pyloric olive**



**Figure 3 (A and B): Abdominal ultrasound in longitudinal section showing muscular thickening (A) with elongation and hypertrophic stenosis of the pyloric muscularis and gastric stasis (B)**

Elsewhere the liver, spleen, kidneys and pancreas were normal on abdominal ultrasound. The bladder seen in good fullness had a normal ultrasound appearance. There was no visible birth defect. The care of our infant was surgery and the evolution was favorable.

## DISCUSSION

### Pathogenesis

Many pathogenic hypotheses have been put forward since the 80s and none of them have been confirmed to date. Two theories interested us: The Neurogenic Theory [1, 3, 4]. The hypertrophy of the

pylorus would be secondary to inefficient antral contractions stumbling on a pyloric spasm. This antropyloric dyssynergy would itself be linked either to an immaturity of the innervation [1, 5], or to a degeneration of this innervation [1, 6]. In the second Hormonal Theory, pyloric hypertrophy would be directly linked to an increase in serum gastrin levels. This hypothesis is based on the high dosages of gastrin in the serum of a cohort of children with pyloric stenosis, and on the reproduction of the disease in puppies by injection of penta gastrin in the mother [1, 7]. Numerous malformations or malformation syndromes associated with pyloric stenosis such as Trisomy 18, Turner Syndrome, Smith-Lemli-Opitz Syndrome, Cornelia de Lange Syndrome, Esophageal Atresia, Hiatal Hernia and Phenylketonuria Congenital rubella [1]. There was no malformation associated with our observation.

### Clinical

Clinically, the main symptom is the occurrence of abundant vomiting of food, in a jet, after the bottle or at a distance from the bottle. These vomitings can be tinged with mucus, more rarely with blood. They are never bilious [1]. Our newborn had jet vomiting. Constipation sets in over the following days, sometimes replaced by small and frequent bowel movements [1]. There was no constipation observed in our observation. Urine is rare. Possible signs of dehydration, free bilirubin jaundice found in 2 or 3% of cases. This jaundice disappears quickly after surgery [1, 8]. We observed dehydration in our clinical case without biological abnormality. Peristaltic ripples are sometimes visible on the upper half of the abdominal wall, especially when the child is undernourished and after ingesting a bottle [1]. We had observed peristaltic undulations and the palpation of an olive under the hepatic awning in our newborn.

### Ultrasound

Ultrasound: This is the technique that allows in most cases [1, 9, 10] to highlight the direct image characteristic of hypertrophy of the pylorus and the rarity of duodenal passages. In clinically atypical cases, it often also makes it possible to affirm the normal character of the pylorus and to look for another cause. Technically, the examination is started on an empty stomach, if necessary after gastric emptying. The child is examined in decubitus, calmed [1]. A longitudinal section and a transverse section allow the measurements of the pyloric olive and its muscularis. The ultrasound made it possible to measure the pyloric olive on a transverse section and the measurement of the muscularis on a longitudinal section. It was with a high frequency probe as advertised in the literature. The best suited probe is a linear array of 8 to 10 MHz [1]. The examination includes a real-time study of the stomach and pylorus and then axis images to measure the length of the canal, the diameter of the olive and the thickness of the muscle wall [1]. In our observation the stomach

was distended and the length of the canal was measured at 22 mm; the diameter of the olive at 13 mm in diameter and the thickness of the muscularis at 4 mm. The topography of the olive and its orientation are variable depending on gastric repletion [1]. In certain doubtful cases, the administration of a bottle is useful to highlight the dynamic signs of the obstacle, violent gastric contractions coming up against the closed pylorus and rare duodenal passages [1].

### Treatment

Medical treatments have been proposed in the past, based on the fragmentation of meals, antispasmodics and posture. It is now accepted that the treatment of hypertrophic pyloric stenosis is surgical [1]. Our newborn had undergone surgery.

### CONCLUSION

Ultrasound is a very reliable diagnostic method provided that a high frequency probe is used, that the topographic varieties of the pyloric olive are well known and that the length of the canal, the thickness of the hypertrophied muscle and the diameter are measured. of the olive. It is a logical complement to the clinical examination to decide on the surgical intervention.

**Conflict of Interest:** The authors declare no conflict of interest.

**Consent:** The parents of the new child gave their informed consent for the study.

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