



ORIGINAL ARTICLE

# Postoperative ultrasonography changes of the pylorus in infants with hypertrophic pyloric stenosis



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## KEYWORDS

Infantile;  
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**Abstract** Infantile hypertrophic pyloric stenosis (IHPS) is a common condition affecting infants. Ramstedt pyloromyotomy procedure remains the standard of surgical treatment of IHPS till today. Postoperative ultrasonography of the pylorus is indicated in patients with persistent vomiting after pyloromyotomy to assess pyloric morphology, gastric emptying and excludes other associated conditions or complications that may present with this clinical picture.

*Aim of the work:* To assess the short term morphological and dynamic changes of the pyloric muscle following pyloromyotomy in patients with HPS.

*Subjects and methods:* Forty infants who were admitted to the pediatric surgery unit at Tanta university hospitals had a preoperative ultrasound (US) examination for assessment of the pylorus for HPS. Follow up postoperative US was performed on the 3rd day, after 1 week and 1 month by the same radiologist.

*Results:* All the patients showed pyloric measurements that exceeded the agreed upon criteria for diagnosis of HPS. On the postoperative scans the pyloric muscle measurements were recorded and compared to preoperative ones.

*Conclusion:* Postoperative US of the pylorus, with emphasis on the pyloric behavior, is a key tool in assessment of the postoperative changes of the pylorus for patient with surgically treated HPS.

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## 1. Introduction

Infantile hypertrophic pyloric stenosis (HPS) is condition affecting approximately two to five per 1000 infants and is the most common condition requiring surgical repair in this age. In HPS the antropyloric portion of the stomach becomes abnormally thickened causing obstruction of the gastric outlet (1,2).

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Typically infants with HPS are clinically normal at birth then in the first few weeks of the postnatal life they develop nonbilious projectile vomiting as a result of the gastric outlet obstruction which may lead to weight loss and death if left untreated (1).

Ramstedt pyloromyotomy procedure remains the standard of surgical treatment of HPS till today. In a very few cases presenting with persistent vomiting caused by an incomplete Ramstedt pyloromyotomy, reoperation is necessary (3,4).

Preoperative ultrasonography of the pylorus is a well established non invasive tool in the diagnosis of HPS allowing direct observation of the pyloric canal morphology and behavior without the hazards of radiation exposure. Ultrasonography clearly shows the morphology of the canal and allows for its measurement (1).

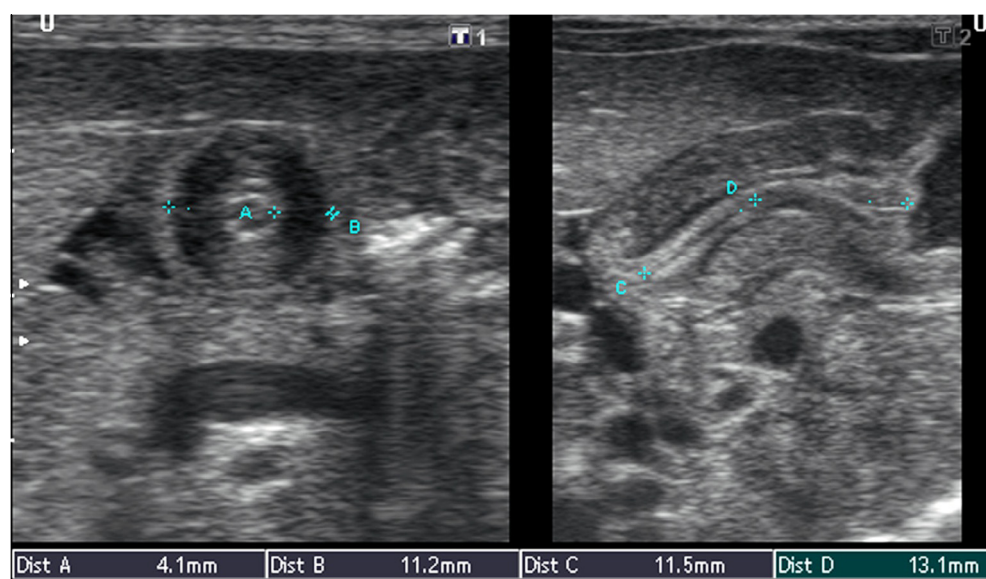
Postoperative ultrasonography of the pylorus is indicated in infants with persistent vomiting after pyloromyotomy in conjunction with upper GI contrast studies to assess pyloric morphology, gastric emptying and excludes other associated conditions or complications that may present with this clinical picture (3–5). Hence, our aim was at assessing the short term morphological and dynamic changes of the pyloric muscle following pyloromyotomy in infants with HPS.

## 2. Subjects and methods

After approval of the Ethics committee at our institution 40 infants who were admitted to the pediatric surgery unit at Tanta university hospitals between January 2012 and June 2013 with the diagnosis of HPS were included in the study. They were 34 males and 6 females. All infants presented clinically with repeated projectile vomiting and failure of weight gain and/or weight loss. The age of the patients at the time of presentation ranged between 22 and 60 days with a mean of 43 days. Informed consents were taken from the infants parents to enroll them in this study. Routine preoperative clinical assessment of infants was performed with emphasis

on detection of a pyloric mass or olive. An initial preoperative ultrasound of the pylorus was performed and the diagnosis of HPS was established based on the widely accepted criteria of a single muscle thickness of more than 3 mm and an elongation of the canal more than 12 mm (1). All infants underwent surgical repair by Ramstedt procedure through a circumumbilical incision approach (Bianchi modification), which facilitated postoperative US assessment as the scar site was away from the scan approach site. All infants recovered smoothly with no complications and were discharged on the 3rd postoperative day. Postoperative ultrasound examinations were performed on the second or at most third postoperative day before patient discharged from the hospital, one week postoperative and one month postoperative. Postoperative ultrasound examinations were all performed by the same radiologist performing the preoperative examination. Scanning was performed using the linear transducer on a Toshiba SSA-590A (Nemio MX, Toshiba Medical Systems, Japan), which has a 6–11 MHz frequency range. Pyloric muscle shape, measurements and behavior on real time B-mode ultrasonography were observed and recorded.

The scanning technique of the pylorus was performed by placing the transducer in the epigastric region with the knob of the transducer towards the head of the infant to obtain a sagittal scan, starting in the midline and slowly moving the transducer laterally towards the right hypochondrium until the pylorus could be identified. In infants with excessive gas in the stomach, which would hinder the scan, they were placed in an oblique position by raising their left side up which displaced the gases away from the pylorus and gastric fluid towards it facilitating better identification of the pylorus. Once the pylorus location was established, rotation of the transducer was done to obtain proper transverse and longitudinal scans in which measurements were taken on. In the postoperative patients the single muscle thickness of the pylorus was measured opposite to the pyloromyotomy site, i.e. at a 180° to the pyloromyotomy incision. The diameter of the pyloric canal was measured across the pylorus not including the pyloromyotomy



**Fig. 1** Preoperative US of a patient with HPS (transverse and longitudinal images of the pylorus) showing its typical appearance of pyloric muscle thickening, elongation of its canal and mucosal bulge into the stomach.

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