



A SINGLE INSTITUTION EXPERIENCE IN HYPERTROFIC PYLORIC STENOSIS

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Keywords: hypertrophic pyloric stenosis, non-bilious vomiting, ultrasonography

Abstract: The most common causes of non-bilious vomiting in infants are hypertrophic pyloric stenosis and pylorospasm. Differential diagnosis between the pathologies establishes the correct treatment. The aim of our study is to present the management of the pathologies cured in our department. The longer the duration of vomiting symptoms the higher muscle thickness was shown. Dehydration and lethargy was associated with higher muscle thickness. There were no intraoperative or postoperative complications recorded in our cases. Ultrasonography is the gold standard in imaging technique but it requires an experienced radiologist. In case of negative physical examination and ultrasonography, but high suspicion of the diagnosis a fluoroscopy may be required. The correct diagnosis avoids unnecessary surgery combined with general anesthesia.

INTRODUCTION

Hypertrophic pyloric stenosis and pylorospasm are the most frequent causes of nonbilious vomiting in children during the first 3 months beside of idiopathic gastroesophageal reflux.(1)

Pylorospasm is defined by the lack of coordinated gastric emptying. Normally, the gastric emptying is coordinated by sequential contractions from the antrum to the pyloric region and duodenum. In this condition the gastric emptying is delayed, the antral peristalsis is functioning and the pylorus is elongated.(2)

Hypertrophic pyloric stenosis with an incidence of 4 per 1000 live births in Western Countries is commonly presented in male infants during the first 2 to 12 weeks of life. The most frequent symptom is repeated, non-bilious vomiting after feeding which is initially non-projectile that with time progresses to a projectile one. Persistent vomiting leads to lethargy and dehydration with hyper or hyponatremia and hypochloremic metabolic alkalosis. Diagnosis can be established easily if an olive-shape, firm pyloric muscle mass can be palpated.

Differential diagnosis is important between hypertrophic pyloric stenosis and pylorospasm because of the treatment options. The treatment of hypertrophic pyloric stenosis is pyloromyotomy and for pylorospasm is conservative by observation and antispasmodics.

Abdominal ultrasound has replaced barium studies in establishing the diagnosis and had become the diagnostic method of choice. The guidelines consider as pathologic limits 3 mm for pyloric muscle thickness and 15mm for pyloric length. Rohrschneider et al. (3) considered the muscle thickness the most discriminating factor. Infants with equivocal physical examination and ultrasound should undergo to barium upper

gastrointestinal study in order to establish the correct diagnosis.(4)

AIM

The aim of our study is to describe the clinical characteristics of patients with infantile hypertrophic stenosis, management and its outcome in the Department of Pediatric Surgery and Orthopedics of County Emergency Clinical Hospital of Târgu Mureș.

MATERIALS AND METHODS

Our retrospective study comprised 24 infants aged between 0 and 2 months who had been presented with suspected hypertrophic pyloric stenosis at the Department of Pediatric Surgery and Orthopedics, County Emergency Clinical Hospital of Târgu Mureș between 2014 and 2020. The collected data were patients' demography categorized by sex and age, clinical presentation, duration of symptoms and ultrasound or barium upper gastrointestinal study findings.

Ultrasonographic criteria for hypertrophic pyloric stenosis is represented by a muscle thickness more than 3 mm. Fluoroscopy was done in cases where the physical examination and ultrasound findings were equivocal. The final diagnosis was made after correlating the clinical, laboratory and ultrasonographic or barium upper gastrointestinal study findings.

RESULTS

24 infants were admitted to our Hospital with suspected hypertrophic pyloric stenosis. 87.5% of them were male infants and 83.3% (n=20) were full-term. 58.3% presented non-bilious vomiting for more than a week before admission, 70.83% was dehydrated in some degree and 62.5% presented lethargy. Laboratory data showed hypochloremic metabolic

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Article received on 07.07.2020 and accepted for publication on 02.12.2020

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alkalosis in 50% of the infants who presented vomiting more than a week. The olive-shaped pyloric muscle mass was palpated in 45.83% of the cases. 21 infants (87.5%) had the positive ultrasonographic criteria for hypertrophic pyloric stenosis; the mean muscle thickness was 4.92 ± 1.62 mm.

A statistically significant difference was found between the duration of vomiting and muscle thickness ($p < 0.01$). The longer the duration of vomiting symptoms the higher muscle thickness was shown. Muscle thickness was higher in the group where the olive mass was palpable but without any statistical significance. Dehydration and lethargy was associated with higher muscle thickness ($p = 0.01$, $p = 0.02$).

In 3 cases the physical examination and abdominal ultrasound was equivocal. The infants were vomiting for less than a week, two of them with symptoms of dehydration. The mean muscle thickness in these cases was 2.7 mm. The fluoroscopy showed delayed gastric emptying. These infants were treated conservatively by observation and antispasmodics. The evolution of these patients was satisfactory; they were discharged from the hospital after 6-7 days.

DISCUSSIONS

Hypertrophic pyloric stenosis is characterized by hyperplasia of smooth muscle that leads to pyloric canal narrowing and gastric outlet obstruction. Male infants were affected in our study in 6.6:1 ratio comparable with data from the literature of 4-6:1 ratio.(5)

The most frequent presentation symptom was non-bilious vomiting. Persistent vomiting can lead to dehydration, weight loss, and lethargy and hypochloremic metabolic alkalosis. The olive shape mass palpable in the epigastric region was present in 45.83% of the cases compared to Macdessi J et al (6) work who states that clinical diagnosis of pyloric stenosis is a declining art. Clinical and laboratory findings can be related to the duration of the symptoms. Hamdi Hamed A (7) found a statistically significant correlation between the muscle thickness and duration of vomiting, presence of dehydration and lethargy which is explained with the pathophysiological mechanism of the illness. Our study showed the same findings.

Muscle thickness is higher among lethargic, dehydrated infants whom are vomiting longer than a week. Starinsky et al. (8) described a muscle thickness increment after effective fluid resuscitation. Diagnosis is hard to establish based only on clinical symptoms. It is important to differentiate the pathology which needs surgery (hypertrophic pyloric stenosis) and conservative treatment (pylorospasm) (figure no. 1.) After pyloromyotomy the muscle thickness gradually returns to normal.

Figure no. 1. Longitudinal oblique plane. A. Cervix sign in HPS – elongated and thickened pylorus resembling a cervix. B. Fluid present in the antrum, normal muscle thickness (2.5 mm) suggestive for pylorospasm



Diagnostic imaging is useful in equivocal physical examination. Ultrasound is the diagnostic method of choice with a sensitivity ranging from 76 to 100% and specificity of 85 to 100%.(9)

The most common measurement criteria for hypertrophic pyloric stenosis is a pyloric muscle thickness greater than 3 mm, a transverse pyloric diameter greater than 13 mm.(10)

Other signs suggestive for pyloric stenosis are described by radiologists as target sign, cervix sign and antral nipple sign. However ultrasound is a non-invasive and non-irradiative, cheap dynamic imaging study, it is hard to examine a newborn. A stomach filled with gas or milk can mislead the diagnosis by displacing the pylorus posterior.(11) In preterm infants the smaller weight and size should be taken into consideration. Argyropoulou et al (12) demonstrated that pyloric dimensions are increasing with the gestational age and body weight.

In our study we performed fluoroscopy in 3 cases because of equivocal clinical examination and borderline measurements. Positive findings would have been an elongated pyloric canal, active gastric hyperperistalsis (caterpillar sign), and double or triple track sign. Delayed gastric emptying was present which put the diagnosis of pylorospasm. The conservative treatment was effective and the patients were discharged after 6-7 days.

All of the patients with the diagnosis of hypertrophic pyloric stenosis underwent surgery (Fredet-Ramstedt extra-mucosal pylorotomy). In the literature there is mortality less than 1% (13) which occurs from fluid and electrolyte imbalance. An intraoperative complication such as mucosal perforation is described in 1-2% (14) of the cases. We had no intraoperative or postoperative complications.

CONCLUSIONS

The triad of visible gastric peristalsis, non-bilious projectile vomiting and palpable epigastric olive mass is not always present.

Physical examination can be equivocal where diagnostic imaging can help. Abdominal ultrasound is the first choice but in case of negativity and high suspicion of the diagnosis a barium upper gastrointestinal study should be performed.

Ultrasonography measurements require an experienced sonographer. The diagnosis should be established correlating the clinical and imaging data in order to avoid the unnecessary surgical treatment.

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