ROLE OF ULTRASONOGRAPHY IN DIAGNOSIS OF INFANTILE HYPERTROPHIC PYLORIC STENOSIS-A PRELIMINARY WORK IN THE NORTHERN PART OF BANGLADESH

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INTRODUCTION

Infantile Hypertrophic pyloric stenosis (IHPS) is commonly encountered in pediatric practice. The typical infant with this lesion presents with nonbilious projectile vomiting and dehydration if the diagnosis is delayed. IHPS accounts for one third of nonbilious vomiting occurrences in infants and is the most common reason for laparotomy before 1 year of age.[1]

IHPS is seen in 2-3/1000 infants in North American and accounts for 30% of all patients presenting with nonbilious vomiting before 1 year of age.[1] The onset of vomiting may occur as early as the first week of life and can be as delayed as late as age 5 months. A striking male preponderance is seen, with a male-to-female ratio of 4-6: 1.[2]

IHPS is more common in whites and is seen less commonly in African, American infants or infants of Asian descent.[3]

Despite its status as a common disease, the cause of IHPS is unclear; however, a definite genetic component exists, since an increased incidence is observed in families in which a sibling or parent has had the disease. The pylorus appears as an enlarged pale muscle mass in IHPS and usually measures 2 to 2.5 cm in length and 1 to 1.5 cm in diameter. Histologically the mucosa and adventitia are normal. There is marked muscle hypertrophy involving the circular layers, which produces partial or complete luminal occlusion. The ethiology of IHPS are genetic, racial and male predominance.[4] The risk increased for the first-bone infant with positive family history and certain ABO blood group.[1,3,4]

Ultrasonography probably has contributed to the changing face of the disease in the past 2 decades, since it results in earlier diagnosis and treatment. Ultrasonography (US) is important and has become the most common imaging technique for the diagnosis of IHPS.[5] In our country, all the Center for Nuclear Medicine and Ultrasonography (CNMU), have the facility of routine ultrasonography for the diagnosis of IHPS. This study was carried out in the Center for Nuclear Medicine and Ultrasound, Rangpur which is located in the northern part of Bangladesh.

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MATERIALS AND METHODS

This study was carried out in the CNMU, Rangpur during the period of July 2003 to June 2004. A total of 66 patients were referred to our center with the complaint of severe vomiting developed about 3-6 weeks after birth. The vomiting occurred immediately after every feeding and was projectile. Our of 66 infants 28 were male and 38 were female, aged between 4 to 7 weeks and the clinical diagnosis was IHPS.

Therefore, US is recommended because its sensitivity and specificity are close to 100% for this disease. If clinical suspicion for IHPS is moderate to high, US also is recommended.

Sonographic examination was done using Toshiba JUST VISON-400 5 MHz curvilinear and 8 MHz linear probe in supine position. In the epigastrium both longitudinal and transverse views were obtained. The water filled stomach was a landmark. In some cases stomach was outlined very easily containing food. Two sonographic criteria were used e.g. pyloric diameter D and the pyloric muscle thickness T and length of pylorus L.

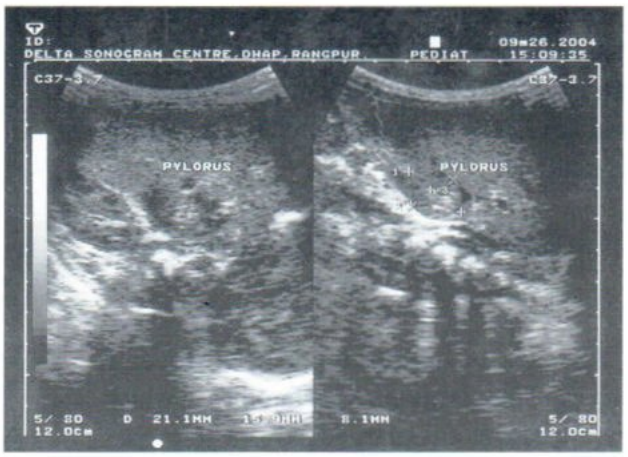

Fig.1

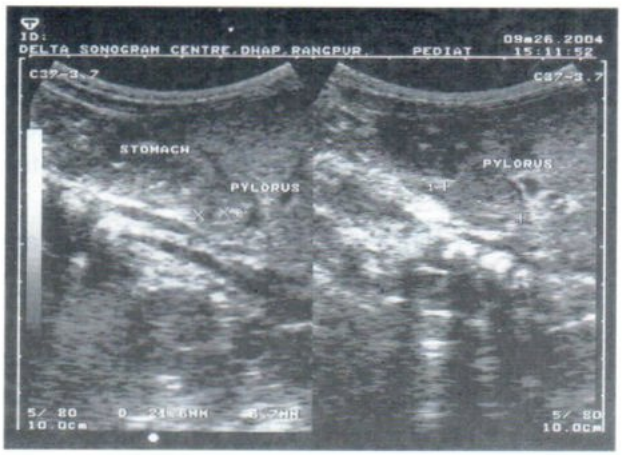

Fig.2

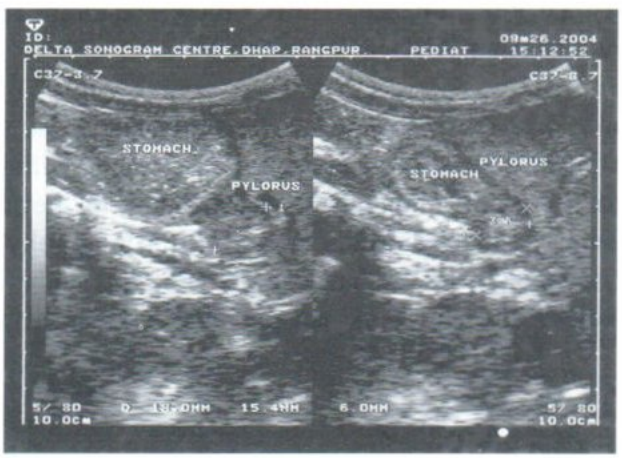

Fig.3

RESULTS

In 63 out of 66 referred cases, had a pyloric diameter D, range between 12.5 to 14.9 mm, the pyloric muscle thickness, T range between 4.0 mm to 6.7 mm, and the pyloric length L were 18 mm to 23. Two cases had D, T and L less than the expected sonographic parameter and they were excluded. In one case we did not visualized pylorus due to excessive upper abdominal gas but which was diagnosed as IHPS by radiology.

In all 63 cases, diagnosis were confirmed by laparotopy and treated by pyloromyotomy (Ramstad).

DISCUSSION

Infantile Hypertrophic Pyloric Stenosis (IHPS) is a well-known pediatric problem. The circular muscle layer becomes thickened, which narrows the pyloric channel and elongates the pylorus. With this process, the mucosa becomes redundant and may appear hypertrophic. With elongation and thickening of the muscle, the pylorus deviates upward toward the gallbladder. The gallbladder serves as a marker, since in IHPS, the pylorus can be seen adjacent to the gallbladder and anteromedial to the left kidney. The thickened pylorus narrows the pyloric channel, resulting in gastric outlet obstruction, gastric distension, and retrograde peristalsis in the stomach.[6]

Sonography has become an important diagnostic adjunct in the western world in the evaluation of vomiting infants who are suspected to have IHPS.[5]

The usual presentation of IHPS is with severe vomiting which starts between 3-6 wks (rare <10 days and >11 weeks). The baby will be normal otherwise. Vomiting after every feeds is copius and nonbilious and some times blood stained due to gastritis or esophagitis. The key feature is readiness and ability to feed again immediately after vomiting. The patient may have dehydration, malnutrition, weight loss and stunted growth.[6]

Early diagnosis and proper treatment is very important for the normal life of the baby. If untreated patient may die due to dehydration and metabolic alkalosis. About 75% definitive diagnosis can be made clinically. Physical examination of upper abdomen is very important. Careful and skilled palpation of the abdomen may reveal tumor like mass of the enlarged pylorus, which is traditionally called pyloric tumor. It feels like an olive or a small pebble.[7]

The preferred diagnostic test is a contentious topic, with a wealth of articles over the last decade discussing cost-effectiveness and the changing face of this disease. The first and most important step in patient workup of suspected IHPS is physical examination. If the pyloric olive is felt, the patient may proceed directly to the operating room without imaging. Many surgeons are uncomfortable with this, since a false-positive physical examination leads to a negative laparotomy. Therefore, US is recommended because its sensitivity and specificity are close to 100% for this disease. If clinical suspicion for HPS is moderate to high, US also is recommended.[8]

Currently, deaths resulting from HPS are rare. Morbidity is linked directly to the duration and frequency of vomiting. Protracted vomiting causes decreased intake and increased loss of essential nutrients and electrolytes, which results in dehydration and metabolic alkalosis. This is in part a result of the accessibility and accuracy of US in the diagnosis of IHPS. When clinical procedure fails than imaging procedure is requedted. The real time Ultrasonography is the first lirte of imaging technique than barium meal study and air contrast medium test.[2,3,4]

The most commonly used sonographic

T = Thickness, L = Length

criteria for diagnosis of positive IHPS is a pyloric muscle thickness of 4 mm or more and a pyloric channel length 16 mm or more. The other criteria is pyloric diameter D greater than or equal to 12 mm and pyloric muscle thickness T greater than or equal to 3 mm showed the positive and negative predictive values 1.00 and 0.80, respectively.[5]

In this study we used three sonographic parameters such as pyloric Diameter (D), Pyloric Muscle Thickness (T) and length of the pylorus(L). The 63 referred cases had significantly larger D, T and L (D=2.5 mm to 14.9 mm and T=4.0 mm to 6.6 mm L=18mm to 23mm). All the patients under went operative intervention and the peroperative findings were correlated with the pre-operative sonographic diagnosis. Sixty three patients were correctly diagnosed for IHPS. Our study shows the sensitivity 95% specificity 100% and accuracy 96%.

CONCLUSION

US has high sensitivity, specificity, snd accuracy in the diagnosis of HPSS. Errors in diagnosis do occur and relate to the operator inexperience, distended formula and gasfilled stomach, overdistended antrum may be mistaken for the pylorus.

This study suggests that proper sonographic criteria are helpful in establishing the diagnosis of IHPS.So ultrasound can be introduced as a first approch in our country for the diagnosis of the IHPS because ultrasound has no radiation hazards, better patient and parent acceptance, no contrast medium and above all reliable diagnosis.

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