

Original Article

Infantile hypertrophic pyloric stenosis: Perspective from a developing country

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ABSTRACT

Background: Infantile hypertrophic pyloric stenosis (IHPS) is pyloric muscle hypertrophy that causes gastric outlet obstruction. This study explores the prevalence of IHPS and the challenges in its diagnosis and treatment in a developing country. The study aimed to identify factors contributing to delays in the diagnosis and treatment of IHPS and compare the management practices for IHPS at the study hospital with international surgical guidelines.

Methods: A retrospective cross-sectional study was conducted at The Aga Khan University Hospital. Data were collected from records of 126 pediatric patients diagnosed with IHPS between January 2015 and 2019. Quality parameters, including delay in presentation, diagnosis, referral, surgery, diagnostic modalities, surgical practice, post-operative feeding, and hospital stay, were assessed. Statistical analysis was performed using SPSS version 22.

Results: Of the 44 included patients, the majority (84%) were male. The mean age at presentation was 5.2 weeks. Ultrasound was the primary diagnostic modality (81.8%), with upper GI studies used in 11.3% of cases. Delays in presentation and diagnosis were observed, with parents' delay being a major factor. The mean lag time between symptoms and surgical consult was 11.2 days, contributing to delays. Complications correlated with increased lag times.

Conclusion: This study reveals variations in IHPS management compared to international guidelines. The hospital predominantly uses an open Ramsted's pyloromyotomy, while laparoscopic surgery is recommended. Postoperative feeding initiation and discharge practices differ from international standards. Delays in diagnosis result from the disease's rarity and a lack of trained surgeons. The study underscores the need to educate primary care physicians and parents for early IHPS referral. IHPS management can be optimized by addressing delays, improving surgical practices, and ensuring early referral and intervention.

Keywords: Hypertrophic pyloric stenosis, Pediatric, Surgery, Feed

INTRODUCTION

Infantile hypertrophic pyloric stenosis (IHPS) is a disorder of young infants characterized by hypertrophy of the gastric pylorus resulting in partial or near-complete obstruction of the gastric outlet.

The incidence of IHPS is 2.4 per 1000 live births in whites, 1.8 in Hispanics, 0.7 in blacks, and 0.6 in Asians. [1,4] It can present from 2 to 8 weeks of age with forceful, projectile, non-bilious emesis, a palpable mass in the mid epigastric region. [2,3]

Pyloromyotomy is the surgical procedure of choice and is curative with excellent results. [5]

In South Asia, the prevalence of pyloric stenosis is low as compared to the Caucasian population. As a consequence, IHPS is not effectively ruled out in the diagnosis of infantile vomiting by primary care physicians in the region. Even once admitted under the care of a pediatrician, lack of exposure to the disease can result in significant delays in the diagnosis. Therefore it becomes imperative to evaluate and address such delays in the diagnosis of IHPS to prevent life-threatening

outcomes of the disease. The aim of this research is to identify factors leading to delay in diagnosis and treatment of IHPS and to compare our hospital's practices in the management of IHPS to International Surgical guidelines.

METHODS

This is a retrospective cross-sectional study conducted in the Pediatric surgery unit of The Aga Khan University Hospital with approval from the institutional review board.

Data collection was done by the process of retrospective chart review using a structured proforma, where patient records from independent patient files and an online healthcare portal database were utilized.

Records of 126 pediatric patients, up till 12 months of age, diagnosed with hypertrophic pyloric stenosis over a 5-year duration period from duration January 2015 to 2019, presenting to Aga Khan University Hospital via emergency room &/or outpatient clinics &/or transfer of services from pediatric medicine team to pediatric surgery team were reviewed and a preset questionnaire used to collect relevant data.

Forty Four (44) patients were included in this study upon meeting the inclusion criteria; that is all infants ages < 1 year treated for hypertrophic pyloric stenosis at our institution were included in the study. Excluded patients were those who had incomplete medical records, or left hospital against medical advice/sought treatment elsewhere.

The primary outcome of this study was to evaluate certain quality parameters in relation to international practices. These parameters included delay in presentation, diagnosis, referral and surgery, use of diagnostic modalities, surgical practice, post-operative feeding, and hospital stay, and if any complications arose.

The secondary outcome was to assess which area resulted in the main cause of delay in presentation of these patients.

Statistical analysis was done using SPSS version 22. Mean and standard deviation were recorded for continuous and discrete variables and frequency and percentages were recorded for qualitative variables. The Association of lag times with complications was assessed using an independent t-test. The Association of lag times with a length of stay was assessed using Pearson correlation. Any result with a p value of less than 0.05 was significant.

RESULTS

A total of 44 patients were included in the study. Majority 84%(n=37) of the patients were male by gender. The mean age of the patients was 37.4 days with a

standard deviation of 17.3 days. The mean weight of the patients was 3.2 kgs with a standard deviation of 0.8 kgs. In 36.4% (n=16) of the patients, a palpable olive-like mass which is pathognomonic for pyloric stenosis was felt. The majority 81.8% (n=36) of the cases were diagnosed on ultrasound. In 11.3% (n=5) of patients, an upper GI study had to be done for diagnosis.

Table 1 describes the reasons for the delay in the presentation and diagnosis of these patients and what factors resulted in this delay. Our study shows that the majority (65.9%) of the patients presented to the emergency room with symptoms that eventually resulted in a diagnosis. These symptoms mainly included vomiting and an electrolyte disturbance. In the majority (63% ; (n=28) of the patients, no electrolyte abnormality was present, but 36% (n=16) of patients had an electrolyte disturbance which included 3 patients with metabolic alkalosis. 27.2% (n=12) of patients presented to their pediatrician and only 6.8% (n=3) of patients presented to a pediatric surgeon. Rest of the children presented via Emergency Assessment rooms. The major cause of delay was delay by parents as documented by delayed presentation to hospital, followed by a delay in getting a surgical consult as majority of the babies were initially taken to emergency rooms or pediatricians which led to initial medical management and a surgical consult only after refractory response.

Since this was a chart review, we were able to calculate the following figures to support the above statement; that is there was a major lag time of 11.2 days with a standard deviation of 6.7 days, in between symptoms to surgical consult. The mean lag time between consultation to surgery was 23.9 hours with a standard deviation of 12.2 hours. (Table 1).

Table 1: Presentation time, place and reasons for delay

Variable	n=44
INITIAL PRESENTATION TO: (type of healthcare setting)	
Emergency Room	29 (65.9%)
Pediatrician	12 (27.2%)
Pediatric Surgeon	3 (6.8%)
Cause of Delay	
Delay by parents	20 (45.5%)
Delay in Surgical consult	17 (38.6%)
Need of upper GI study (diagnostic imagine)	7 (15.9%)
Mean age at presentation to surgeon (days) with Standard Deviation	37.4 ± 17.3
Lag between symptoms and surgical consult (days)	11.2 ± 6.7
Lag between surgical consult and surgery (hours)	23.9 ± 12.2

Table 2 shows the association of delay in presentation of patients with pyloric stenosis to complications. The major complications that arose following surgery

included vomiting, abdominal distension, delay in establishing feed, and duodenal perforation with sepsis. These complications arose in a total of 22 patients (50%). There was a positive correlation of delay in presentation to complications. Delayed presentation resulted in more patients having complications with a p-value of 0.371. There was a significant association of an increase in lag time between surgical consultations to the surgical procedure with a p-value of 0.004.

Our study shows that in patients that had no complications, the mean lag time was 20.91 ± 15.26 hours whereas, in patients with complications, it was 32.73 ± 15.26 hours. A significant association was also noted in the delay of presentation between symptoms to surgical consult, with a p value of 0.017. In patients with complications, the mean postoperative stay was 6.45 days with a standard deviation of 1.29 days, whereas in patients with no surgical complications, the mean stay was 3.73 days with a standard deviation of 1.29 days.

Table 2: Association between delay and outcomes

Variable	Complications		p Value
	Yes	No	
Age at Presentation (days)	41.45 ± 17.13	36 ± 17.13	0.371
Lag between Surgical Consult and surgical intervention (hours)	32.73 ± 15.26	20.91 ± 15.26	0.004
Lag between symptoms to surgical consult (days)	15.27 ± 9.24	9.79 ± 9.24	0.017
Post-Operative Hospital Stay (days)	6.34 ± 1.29	3.73 ± 1.29	<0.001

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DISCUSSION

Infantile hypertrophic pyloric stenosis is characterized by the hypertrophy of the pylorus, which often always leads to gastric outlet obstruction. Our research is the first of its kind and we wanted certain quality parameters in the management of hypertrophic pyloric stenosis in comparison to international practices and to account for lag times that result in a delay in the management of these patients. In this paper, we also discuss the major causes that resulted in this delay of presentation and management and any complications that occurred as a result.

This study included 44 patients which met the inclusion criteria. Out of these patients, the ratio of male patients to female patients was 5:1 which is consistent with international literature as pyloric stenosis is 4 times more likely to occur in first-born male patients than females. [7] Pyloric stenosis usually presents around 3 to 8 weeks of life, and our study shows that patients presented with a mean age of 5.2 weeks as well. In the majority of our patients, a palpable olive was not felt at presentation, which is consistent with guidelines as it isn't always palpable. For a high majority, an ultrasound abdomen established the diagnosis, and only in a small population, there was a need of doing an upper GI study to confirm the diagnosis as is shown in Table 1. This is consistent with international practices as ultrasound is the diagnostic intervention of choice for pyloric stenosis.

This study looked at various areas which result in a delay in presentation of these babies to the pediatric surgeon. Pyloric stenosis is not a very common disease so a lot of times, primary care providers only seek help when the patient has symptoms of gastric outlet obstruction. [9] This was mainly seen in our study, as the majority of the patients initially presented to the emergency room for these complaints, and were referred to surgery after a diagnosis was made. This is what mainly resulted in a delay in presentation to the pediatric surgeon.

The major cause of delay was by parents in bringing the patients to the hospital, which was followed by a delay in getting a surgical consult. In some of the cases, the delay resulted from an indeterminate diagnosis in ultrasound where there was a need of getting an upper GI study. Our study shows a very significant lag time of 11.2 ± 6.7 days from the time symptoms started to the surgical consult. This is a very significant time delay which is inconsistent with International practices and likely arose from the fact that pyloric stenosis is an uncommon disease that takes time for diagnosis if there is a lack of

training, as is in the setting of a low-middle income country like Pakistan.

Another reason for this major delay is that not all hospitals have trained pediatric surgeons, because of which, the patients had to be transferred to hospitals with this specialty, thereby increasing lag time. There was also a lag time of 23.9 ± 12.2 hours from getting a surgical consult to the actual surgery being performed, which mainly accounted for time spent in stabilizing the patient and correcting any electrolyte disturbances, which were present in 36.4% of the patients.

The study demonstrated variability in pre-operative, operative, and post-operative practices compared to international guidelines. In our institution, all patients underwent Ramsted's Approach to open pyloromyotomy. International guidelines say that laparoscopic pyloromyotomy along with medical treatment is the optimal treatment choice for infantile pyloric stenosis. [10] This is a clear comparison that we are still using an outdated procedure for all patients because of the lack of expertise and trained pediatric surgeons to perform a laparoscopic pyloromyotomy.

Postoperative practices at our institution also vary when compared to international practices. Our data showed that the time taken to initiate feed was 12 to 24 hours and establishment of full feed took 24 to 48 hours in 84.1% of babies. This is a significant difference when compared to international guidelines that suggest initiation within 2 hours post-operative.

A laparoscopic pyloromyotomy is considered a day-care procedure and based on available evidence, the patient can be discharged on the same day after the establishment of feed, however, even uncomplicated cases in our service were discharged in 3.73 ± 1.29 days.

This study also compared the difference in lag period times to any complications. The results show a significant correlation of increased lag time from surgical consult to surgery resulted in greater complications, as was the case with an increased lag time between symptoms to consult. Our study shows that in patients that had no complications the mean lag time for consultation to surgery was 20.91 ± 15.26 hours whereas in patients with complications, it was 32.73 ± 15.26 hours with a p-value of 0.004. A significant

association was also noted in the delay of presentation between symptoms to surgical consult, with a p-value of 0.017. In patients with complications, the mean postoperative stay was 6.45 days, whereas in patients with no surgical complications, the mean stay was 3.73 days.

CONCLUSION

This study shows very clearly the areas we lag behind in as a low-middle income country. Our surgical practices have delayed diagnosis and we are still using an Open Ramsted's Pyloromyotomy whereas the guidelines indicate that Laparoscopic surgery is the gold-standard procedure of choice.

We also establish feed later than international practices which results in a delayed discharge of patients. There is a very high lag time between patients developing symptoms, to them reaching a pediatric surgeon, which is because the disease is uncommon and there is a lack of trained surgeons, so reaching them increases the lag time. There is a need to educate primary care physicians (general practitioners, pediatricians) and parents for early referral and surgery in infants presenting with persistent vomiting.

Our paper has also shown a delayed presentation results in more complications. Therefore, pyloric stenosis should be treated promptly and a fast diagnosis should be made before the patient reaches complications. Pediatric surgeons should also receive training in laparoscopic surgery so gold standard management can be followed in our treatment.

Conflict of Interest: Nil

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