# Infantile Hypertrophic pyloric stenosis: A retrospective study from a Tertiary Hospital in Ethiopia

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***Back ground:*** ***Infantile hypertrophic pyloric stenosis(IHPS) is a common infantile disorder characterized by enlarged pyloric musculature and gastric outlet obstruction(1). IHPS typically presents with progressive projectile non-bilious vomiting this usually commences between second and eighth week of age. To date there is only one article written 23 years ago about IHPS in Ethiopia (9). The objectives of this study were to determine the incidence of IHPS at the Tikur Anbessa teaching referral hospital (TAH) over a period of 2 years, analyze the clinical presentations, mode of treatment and outcomes of treatment.***
***Methods:*** ***In this retrospective analysis, medical records of patients admitted to TAH, Addis Ababa, Ethiopia, with a diagnosis of IHPS in the years 2011 and 2012 were revised; information on age, sex, birth order, clinical presentation, treatment and outcomes of treatment were collected and analyzed.***
***Results:*** ***Sixty one infants with a diagnosis of IHPS were admitted to TAH, Addis Ababa, Ethiopia over a period of 2 years (2011-2012). The clinical records of 55 infants were retrieved and analyzed. The prevalence was 12.9/1000 admissions. The male to female ratio was 6.86:1. The mean age at admission was 44.47days. The mean duration of illness was 26.91 days. A palpable mass was found in 14(25.5%) of infants and constipation is reported in 14(25.5%). The treatment was Ramstedt's pyloromyotomy in all cases. There were 6 (10.9%) intra-operative mucosal perforation. Eight patients developed postoperative complications - 6(10.9%) wound infections, and 2(3.8%) pneumonia. Two patients died.***
***Conclusions:*** ***This study has shown that IHPS is a common condition affecting infants with a prevalence of 12.9/1000 admissions. There was prolonged duration of illness, prolonged preoperative hospital stay and high proportion of dehydration and electrolyte disturbance. To avoid delay in diagnosis physicians should have high index of suspicion in infants with non-bilious vomiting,***

## Introduction

Infantile hypertrophic pyloric stenosis (IHPS) is a common infantile disorder characterized by enlarged pyloric musculature and gastric outlet obstruction[1]. IHPS typically presents with progressive projectile non-bilious vomiting which commences between second and eighth weeks of age. The clinical presentation, diagnosis, and treatment of IHPS are well-established, the aetiology remains unclear. Although there is a genetic component, some evidence suggests that postnatal factors may also play an important part[2].

Male gender and a family history of IHPS are consistently reported risk factors and suggest a genetic component to the etiology[2]. Symptoms usually do not arise until the second or third week after birth and only exceptionally before, suggesting that early exposures such as feeding practices could be important risk factors[3,4].

Extra mucosal longitudinal myotomy of the pylorus (Fredet-Ramstedt procedure) has long been the standard management[5]. The first description of pyloromyotomy using the laparoscopic approach appeared in the literature in 1991[6]. This report was followed by several small institutional series describing the 3-port technique as feasible and safe. An early review of these reported cases concluded that, assuming the surgeon was equally familiar with both approaches, the laparoscopic technique was preferred over the open approach due to superior cosmesis and otherwise equal efficacy[6-8]. The objectives of this study were to determine the incidence of IHPS at the Tikur Anbessa

teaching referral hospital (TAH) over a period of 2 years, analyze the clinical presentations, mode of treatment and outcomes of treatment.

## Patients and Methods

In this retrospective analysis, medical records of patients admitted to TAH, Addis Ababa, Ethiopia, with a diagnosis of IHPS in the years 2011 and 2012 were revised. During the study period a total of 4,729 patients were admitted at the pediatric ward, out of which 61 were surgically confirmed IHPS cases. Fifty five of the 61 medical records were retrieved; information on age, sex, birth order, clinical presentation, treatment and outcomes of treatment were collected and analyzed.

## Results

A total of 61 cases of IHPS were admitted and operated during the study period. Among these 55 charts were retrieved and analyzed. (90.16% retrieval rate) The mean occurrence of IHPS at TAH is 12.9/1000 admission Forty-eight (87.3%) infants were male and seven (12.7%) were female; the male to female ratio was 6.86:1. The mean age at admission was 44.5 days with a range of 21-120 days (SD +/_ 21.2 days).

The mean duration of illness was 26.9(3-87days with SD of 21.35). There were 11(20%) infants who started vomiting very early during the first week of life, while the majority of cases 40(72/%) became symptomatic within one month of age. The mean age at onset of symptom was 16.4 day Only 4(7.3%) became symptomatic after one month of age. The birth rank of the infants with IHPS is shown I Table 1.Fifty (90.9%) were breastfed infants, 4(7.3%) were bottle fed. Non-bilious vomiting was described in all (100%) patients, palpable mass was found in 14(25.5%) of infants and failure to pass stool is reported in 14(25.5%) of infants. Twenty eight (50.9%) didn't have dehydration, while 18(32.7%) had some dehydration and 8(14.5%) had severe dehydration Almost half of infants had hypokalemia-27(49.1%), and hyponatremia (41.8%). Chloride was determined only for 25 cases and 16(64%) of those were found to be hypochloremic.

**Table 1** Distribution of IHPS cases bay birth rank in TAH, August 2013.

| Birth rank | Number | Percent |
|---|---|---|
| **1st born** | 31 | 56.4 |
| **2nd born** | 13 | 23.6 |
| **3rd born** | 5 | 9.1 |
| **4th both** | 4 | 7.3 |
| **5th born** | 2 | 3.6 |
| **Total** | **55** | **100** |

**Table 2.** Clinical presentation of IHPS cases in TAH, August 2013.

| Presentation | Number | Percent |
|---|---|---|
| **Non-bilious vomiting** | 55 | 100 |
| **Failure to pass stool** | 14 | 25.5 |
| **Palpable mass** | 14 | 25.5 |
| **Dehydration** | 26 | 47.27 |

There was no documented congenital anomaly, maelena or jaundice. Diagnosis was confirmed with ultrasound in all cases. The mean preoperative hospital stay was 7.8 days (2 days- 21 days with standard deviation of 4.60).

The treatment was Ramsteidt'spyloromyotomy in all cases. In all except one case, general anesthesia was used. One case was operated under local anesthesia due to failure of intubation. Right upper quadrant transverse incision was used in all cases. There were 6 (10.9%) intra-operative mucosal perforations which were repaired. In 34 (61.8%) of the infants, test feeds were started with within 12 hours of surgery, in 16 (29.1%) were started within 12 -24hours, while 5(9.1%) of the infants were kept nil per mouth for more than 24 hours.

Eight patients developed postoperative complications - 6(10.9%) had wound infections and 2(3.8%) developed pneumonia. Two patients died; one died of respiratory distress on the immediate post-operative day. The cause of death for the second baby was not documented in the chart. The first death occurred to a 33-day old male infant who presented with non-bilious vomiting from the 14$^{th}$ day of life and was found to have severe dehydration on presentation. The serum electrolytes determined on the day of presentation were normal. He was operated 3 days later after he was stabilized. The operation was smooth and patient transferred to the ward with stable vital signs. After 8hrs postoperatively, patient given 30ml 10% dextrose test feed. Then the infant developed respiratory distress, started to produce frothy and bloody sputum through his mouth and nose and expired immediately. The possible cause of death in this infant was pulmonary oedema secondary to fluid overload or aspiration.

The second death occurred to a 29-day old male infant who came with non-bilious vomiting since the 5$^{th}$ day of life. This infant also had severe dehydration on presentation. He also had hypochloremia (85.3), but potassium and sodium were within normal limit. While in the ward, he developed generalized purpural rash all over his body which was attributed to acquired zinc deficiency and was put on nutritional supplementation. He was operated on 19$^{th}$ day of admission and died on the same day with unexplainable cause.

The mean hospital stay was 12.69 days.

## Discussion

The Occurrence of IHPS in this review is 12.9/1000 admissions The apparent increase in incidence from previous study done in the same institution could be due to the accessibility and utilization of ultrasound as diagnostic mode, increased heath service accessibility, increased level of awareness among health care workers, increased capacity at TAH[9]. An average of 5 cases every two months shows that IHPS is a common disease. The incidence of IHPS however has shown a significant decrease in Denmark since 1993 and continued to accelerate since then[17]. IHPS is a disease that is customarily said to affect first born male infants. Our study is also in agreement with this finding which showed higher incidence of occurrence in first born infants and male sex in agreement with most literatures[2, 3, 10–12].

Non-bilious vomiting, gastric peristalsis and palpable abdominal mass are said to be the cardinal clinical indicator of IHPS. In this series all cases had non-bilious vomiting but palpable abdominal mass was detected only in 25.5% of the cases. Success in palpating abdominal mass ranges from 40-100% in published series[13]. The low success in palpating abdominal mass in this study could be over reliance on ultrasound.

The mean duration of illness in this study of 26.91 days was longer than most published series[13]. This could be due to lack of awareness of families to consider the vomiting as minor symptom and ignore it, or misdiagnosis of the disease. The prolonged duration of illness also explains the fact that almost half of the infants in this series were hypokalemic (49.1%), hyponatremic (41.8%), and dehydrated

(47.27%), which is an expected occurrence in untreated cases[13]. When these derangements occur, they should be corrected before surgical treatment. There was also prolonged preoperative hospital stay (7.78 days), which could be due to time needed to correct the fluid and electrolyte abnormalities, late admissions, unavailability of beds and busy surgical service.

Open Ramstedt's pyloromyotomy is said to be the standard treatment for IHPS. But since the 1990's laparoscopic pylopromyotomy is introduced and is said to have comparative outcome in terms of mortality and morbidity with superior cosmetic outcome[6]. Atropine has also shown some effect with prolonged treatment and can be an option for poor surgical candidates[14]. Ramsteidt's pyloromyotomy, the definitive treatment mode of IHPS, is said to carry an operative mortality of <1%. In this series, all cases were operated with this method and there were 2 deaths making the mortality rate to be 3.2%.

The fact that both deaths in our series occurred on the same postoperative day after a smooth operation raises a big question on our postoperative care both in terms of human power and facilities to care for postoperative infants who needs strict fluid balance, ambient environment to prevent hypothermia and other supportive cares. Such infants are transferred to the general ward on the immediate postoperative period. The operative mortality in a Ghanian review is 3.6% and 2.3% in an Iranian series[10,15].

The mean length of hospital stay in this series was 12.69days, which was longer than most published data of 4-7days[12,15,16]. This could be due to prolonged preoperative hospital stay (7.78 days) which we recorded. The post-operative hospital stay is 4.9 days. In a research done in this hospital 23years ago patients stayed in hospital from 7 to 28 days[9].

## Conclusion and Recommendation

This study has shown that IHPS is a common condition affecting infants with occurrence of 12.9/1000 admissions. Therefore general surgeons should be familiar with this condition and be able to handle such patients at regional levels and as a teaching institution TAH should also introduce laparoscopic pyloromyotomy.

There was prolonged duration of illness, prolonged preoperative hospital stay and high proportion of dehydration and electrolyte disturbance. Physicians should have high index of suspicion in infants with non-bilious vomiting, to avoid delay in diagnosis. There should be a guideline to correct the fluid and electrolyte disturbance after diagnosis to shorten preoperative hospital stay.
There were two deaths which could not be explained by the nature of the operation. Postoperatively; these patients have to be managed carefully in pediatrics ICU, at least for the immediate postoperative period. Further studies are needed in this area to improve for the care of infants with IHPS.

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