Retrospective Study on Anesthetic Management of Infants with Hypertrophic Pyloric Stenosis

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ABSTRACT

INTRODUCTION: Infantile hypertrophic pyloric stenosis (IHPS) is a condition of hypertrophy of the pylorus, with elongation and thickening, eventually progressing to near-complete obstruction of the gastric outlet. This study aims to evaluate the anesthetic outcome of infants with hypertrophic pyloric stenosis.

METHODE: A retrospective study on anesthetic management of infants with hypertrophic pyloric stenosis was carried out for a total duration of one year from Shrawan, 2064 to Ashad, 2065 at Kanti Children’s hospital, Maharajgunj, Kathmandu, Nepal. Infants from 20 days to 4 months of age who presented with projectile non-bilious vomiting after each feed with failure to gain weight, and dehydration, underwent surgery for pyloric stenosis were included in the study.

RESULT: A total of 1820 surgical cases were observed during the study period. Out of the total, 1385 were routine surgical and 435 were emergency surgical cases. Of the total surgical cases (1820): 2% (48/1820) cases were diagnosed as a case of surgical emergencies due to pyloric stenosis. Among the 48 pyloric stenosis cases; 15% (8/48) cases had intraoperative complications: of which 9% cases showed delayed recovery, 4% cases faced difficulty during intubation, and 2% patient had perforation at pyloric junction.

CONCLUSION: All the cases were managed successfully in our anesthetic setup; however, these figures highlighted the importance of preoperative correction for these complications to minimize the anesthetic risk management in the medical surgical emergency cases.

KEY WORDS: dehydration, hypokalaemic hypochloremic metabolic alkalosis, pyloric stenosis.

INTRODUCTION

Infantile hypertrophic pyloric stenosis (IHPS) is a condition of hypertrophy of the pylorus, with elongation and thickening, eventually progressing to near-complete obstruction, of the gastric outlet. It occurs in approximately 2 to 3.5 in 1000 live births, although rates and trends vary markedly from region to region. It is more common in males than in females (4:1 to 6:1). It is more common in males than in females (4:1 to 6:1). Symptoms usually start between 3 and 5 weeks of age, and occurs rarely after 12 weeks of age. Approximately 30% of cases occur in first born male children.

The classic presentation of IHPS is 3 to 6-week-old baby who develops immediate postprandial, non-bilious, often projectile vomiting and demands to be re-fed soon afterwards "hungry vomiter". Patients are classically described as being emaciated and dehydrated with a palpable "olive-like" mass at the lateral edge of the rectus abdominus muscle in the right upper quadrant of the abdomen. The frequency of palpation of the "olive" is quite high (up to 92%). The "olive" is most easily felt immediately after emesis because it might otherwise be obscured by a distended antrum and/or tensed abdominal muscles. Peristaltic waves may be seen progressing across the child's upper abdomen from left to right just before emesis.

Laboratory evaluation classically shows a hypochloremic, hypokalemic metabolic alkalosis resulting from loss of large amounts of gastric hydrochloric acid, the severity of which depends upon the duration of symptoms prior to initial evaluation. Hypokalemia typically is

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not seen early but is quite common in babies who have been vomiting for longer than three weeks 25.

Once the diagnosis of pyloric stenosis is done, it is the medical urgency. So the management is focused towards three principles:

- Supportive therapy
- Circulatory support,
- Correction of electrolyte imbalance and
- Prevention of aspiration

Infants presenting with normal electrolyte values and mild dehydration like in the case with more than 60% of patients, should receive maintenance intravenous fluids such as 5% dextrose with 0.25% NaCl and 2 meq KCl per 100 mL. Infants with moderate or severe dehydration require more involved fluid management with higher NaCl concentrations (0.5% to normal saline) and higher rates of administration (1.5 to 2 times maintenance), perhaps combined with bolus administration initially. Caution must be taken in more severely dehydrated infants to ensure the kidneys are functional prior to the addition of KCl to the intravenous fluids. The correction of alkalosis prior to surgery is imperative because alkalosis has been associated with an increased risk of post-operative apnea 26.

A. Diagnostic:
- Complete blood count
- Serum electrolytes
- Ultra sonography
- Arterial blood gas analysis

B. Corrective and the definitive therapy:

This should be done once the patient is stabilized satisfactorily. The classical operation for IHPS is Ramstedt pyloromyotomy, which involves a longitudinal incision of the hypertrophic pylorus, with blunt dissection to the level of the submucosa; it relieves the constriction and allows normal passage of stomach contents into the duodenum. Laparoscopic pyloromyotomy is a minimally invasive version of the Ramstedt procedure 27, 28 that has been associated with a lower incidence of postoperative emesis and a shorter hospital stay 29.

The timing of surgery depends upon the clinical status of the infant. If the diagnosis is made early and the child is well-hydrated with normal electrolytes, then the surgery might take place on the day of diagnosis 28. Surgery should be delayed if there are dehydration and/or electrolyte derangements 29.

RETROSPECTIVE STUDY ON ANESTHETIC MANAGEMENT OF INFANTS WITH HYPTERTROPHIC PYLORIC STENOSIS

A retrospective study on anesthetic management of infants with hypertrophic pyloric stenosis was carried out from Shrawan 2064 to Ashad 2065 at Kanti children’s hospital, Maharajgunj, Kathmandu, Nepal. This study aims to evaluate the anesthetic outcome of infants with hypertrophic pyloric stenosis. All surgical cases of the infants who had undergone surgery for pyloric stenosis were analyzed. Both the routine and emergency cases were taken into account. Age, weight, sex, mode of anesthesia and analgesia, use of muscle relaxant and disposal of the patients were analyzed. The study includes infants from 20 days to 4 months of age, who had undergone surgery for pyloric stenosis and presented with projectile non-bilious vomiting after each feed, dehydration and failure to weight gain. Those infants less than 20 days of age and more than 4 months of age who underwent surgery for pyloric stenosis were excluded from the study. After admission of the suspected case for pyloric stenosis, the patient underwent detailed clinical examination and investigated for complete blood analysis with serum electrolytes and ultra-sonography. Adequate temperature, rehydration and electrolyte imbalance was corrected to normal range. Nasogastric tube was passed and gastric aspiration was done. Pre-operative evaluation was done for each child and informed written consent for anaesthesia and surgery was taken.

In the operation theatre, before induction of anesthesia, the operating room temperature was maintained above 26°C to prevent hypothermia. Intra-operative monitoring was done with pulse oxymetry, electrocardiography, non-invasive blood pressure, surface temperature and pre-cordial stethoscope. All infants were induced with IV Sodium Thiopentol and intubation was facilitated by succinylcholine (crash intubation). Pre-emptive local anesthesia was used with 0.25% bupivacaine 2mg/kg. Narcotics were not used. Maintenance was done by oxygen and halothane with assisted ventilation. Muscle relaxant was not used. After closure of the peritoneum, all anesthetics were switched off so as to bring back spontaneous recovery. After spontaneous breathing and full recovery, patients were extubated and transferred either to surgical intensive care unit or post operative ward.
RESULTS

A total of 1820 surgical cases were observed during the study period. Out of the total, 79% (n=1385) were routine surgical and 19% (n=435) were emergency surgical cases. Of the total surgical cases (1820): 2% (48/1820) cases were diagnosed as a case of surgical emergencies due to pyloric stenosis (Figure 1).

The sex ratio was 3:1 (male: female-65%:35%) in pyloric stenosis. The incidence of pyloric stenosis in a male child was 31 where as in female was 17(Figure 2).

Out of 48 patients who had underwent surgery, 15% (8/48) of the patients showed intra-operative complications: among those, 9% (5/48) cases showed delayed recovery, 4% (2/48) cases faced difficulty during intubation, and 2% (1/48) patient had perforation (Figure 3).

During the post-operative period none of the patients showed any signs of complications, however in the ward, few cases had vomiting which was relieved by the use of anti-emetics. All the cases recovered fully and were in good health on the next day follow-up visit.

DISCUSSION

Infantile hypertrophic pyloric stenosis (IHPS) is believed to be a congenital problem, however, evidence suggests that it develops postnatally. Surgical correction of the condition by splitting the pyloric muscle and leaving it open to heal secondarily is the definitive mode of management. This study took the advantage of tertiary care referral center, Kanti Children hospital for the management of pediatric surgical cases. The study is not population-based but includes all live-born infants with IHPS referred for tertiary level management. In this study, of the total surgical cases, 2% of the cases were of the pyloric stenosis and male female ratio was 3:1 and this figure is comparable with global incidence of IHPS. Globally, IHPS affects approximately one to three infants per 1000 live-born infants and affects about four to five times as many male as female infants.

In our study, complication rate is about 15% (8/48) which seems to be quite high in comparison to report which showed that 40 of 901 (4%) infants who underwent pyloromyotomy had an intra-operative complication. A review of cases from the Royal Hospital for Sick Children in Glasgow, Scotland showed a decrease in mortality from 59% in 1925 to 0% in 1975. There is no mortality in our study. In our study, about 9% (5/48) cases showed delayed recovery for which prolong post-operative anesthetic care was delivered. In 4% (2/48) cases that faced difficulty during intubation were managed by oxygenation and intubation on next attempt. In 2% (1/48) patient who had duodenal perforation recognized immediately and perforation was corrected by suturing and nasogastric tube was left in situ. These conditions and other minor difficulties were diagnosed timely and managed immediately.

In one study, fifty-two infants (6%) had post-operative complications, with wound infection in less than 1% and vomiting in 3% whereas, in our study, no major post-operative complications were observed. In other study, gastro oesophageal reflux (11%), duodenal perforation...
(8%), and wound infection (5%) are reported as most frequent complications\(^{10}\) and another study reported that the incidence of wound dehiscence and bleeding is very low\(^{37}\). Although post-operative vomiting is fairly infrequent, the incidence of modest regurgitation can be as high as nearly 80%\(^{7}\) and its presence should not delay the institution of post-operative feeding.

In conclusion, IHPS cases reported during 2064-65 were reviewed, and in our hospital setup, all the cases were managed successfully. However, these figures indicate the importance of pre-operative optimisation for the associated complication to minimize the anesthetic risk in managing these complicated cases.

REFERENCE:

28. Poon, TS, Zhang, AL, Cartmill, T, Cass, DT. Changing patterns of diagnosis and treatment of infantile...


