

Management of pyloric stenosis in children

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Abstract

A prospective study of 24 cases of infantile hypertrophic pyloric stenosis in Salahaldeen government from February 2008-february 2011. All patients evaluated according to family history, sex, age, age at starting of vomiting and hydration state. Examination done for any palpable mass and sign of dehydration, and muscle wasting ,feeding test done for all patients. Patients admitted to hospital and investigations done which includes complete blood picture, blood urea, serum electrolyte. All patients send for ultrasound study of the pyloric canal to evaluate the length and thickening of the pyloric canal and consider as appositive study if the length more than 14mm and thickening more than 4mm pyloromyotomy done for all case with very good result and most of patient discharge after 24h of surgery.

Introduction

Infantile hypertrophic pyloric stenosis (IHPS) is a common cause of gastric outlet obstruction in infants and presents as one of the most common surgical conditions of infancy⁽¹⁾. It occurs in 1 to 3 of every 1000 live births⁽²⁾. The problem is associated with a 4:1 male-to-female ratio. Pyloric stenosis appears to be more common in infants of Caucasian decent and is rare in Asian children⁽³⁾. It is an acquired disorder of unknown etiology in which hypertrophy of the muscle fibers of the pylorus occurs, causing a mechanical obstruction of the gastric outlet along with its associated metabolic and electrolyte abnormalities. This condition has been successfully treated for decades with the open Ramstedt extramucosal pyloromyotomy, which clearly stands as the gold-standard treatment against which all other techniques must be compared⁽⁴⁾. So highly effective is this simple, elegant, and inexpensive operation that it has been described as 'one of the most easy and gratifying procedures performed by pediatric surgeons'⁽⁵⁾ and 'the most consistently successful operation ever described'⁽⁶⁾. Despite the success and popularity of the Ramstedt pyloromyotomy, complications occasionally do occur including prolonged post-operative emesis, wound infection, and duodenal perforation. In addition, there is a permanent scar, which may negatively impact on the self image of some children. To deal with the issue of cosmesis some surgeons have advocated a circumumbilical incision for pyloromyotomy⁽⁷⁾. However, it appears that this approach, although an acceptable alternative to Ramstedt's technique, has its own shortcomings including infection, incisional hernia, and prolonged gastroparesis. The

laparoscopic approach to pyloromyotomy obviates many of these concerns. There is clearly an advantage as far as cosmesis is concerned and the anticipated increased complication rate and costs have not consistently been demonstrated. The technique has evolved over the last decade and appears to be at the very least an acceptable alternative to the time-honored open approach.

Diagnosis Infants suspected of pyloric stenosis usually present with the onset of non-bilious vomiting, beginning at 3-6 weeks of age. The pattern of vomiting varies, but often progresses to the characteristic 'projectile' vomiting. Often, infants have undergone numerous formula changes before the diagnosis is made. Severe or neglected cases can result in significant weight loss and failure to thrive. An examiner may observe gastric peristaltic waves traveling from the infant's left upper abdomen toward the right side and the diagnostic finding is a mobile, ovoid mass, commonly referred to as an 'olive', palpable in the epigastrium or the right upper quadrant. In the absence of a palpable "olive", diagnostic imaging can be helpful. Plain radiographs of the abdomen may show gastric distention.⁸ An abdominal ultrasound is the most sensitive test for diagnosis and should be performed if the "olive" is not palpable. The characteristic appearance of pyloric stenosis on ultrasound is that of a "doughnut" or "bull's eye" on cross section of the pyloric channel. Pyloric dimensions with positive predictive value greater than 90% are muscle thickness greater than 4mm and a pyloric channel length greater than 17mm. These limits may be lower in infants less than 30 days of

age⁽⁸⁾. When ultrasound is not available, a contrast upper gastrointestinal study (UGI) will confirm the diagnosis. The classic radiographic signs are the "string sign" and the "shoulder sign" caused by the hypertrophied muscle protruding into the gastric channel. Infants with a diagnosis of pyloric stenosis will show characteristically low Cl⁻ and H⁺ ions as measured in the serum. Due to the loss of K⁺ and H⁺ ions in the urine and Cl⁻ in the emesis, the infants will retain HCO₃⁻ and a resultant metabolic alkalosis occurs. In severe cases with diagnostic delay, hypoglycemia and hypoalbuminemia can be observed.⁸

Management

Infants with less than 5% dehydration and no electrolyte imbalance are candidates for surgery without delay. Infants with electrolyte abnormalities or dehydration require correction of both. Due to the severity of the dehydration, these infants are typically resuscitated with twice the maintenance volume of normal saline solution until they void. Then, potassium is added to the intravenous fluids, which are changed to half-normal saline at 1.5 times

maintenance. It may take 48 hours or longer to fully resuscitate an infant and prepare them for surgery.⁹ Lactated Ringers Solution is not to be used as an initial resuscitation fluid. Nasogastric tubes should be avoided as they further deplete electrolytes. Once an infant is resuscitated, the pyloric stenosis is treated surgically.¹⁰

Surgical Techniques

Since Ramstedt, the treatment has been pyloromyotomy. This procedure is done under general anesthesia with several incisions described, none of which have any particular advantage. A circumumbilical incision is recommended by some to hide the incision. Regardless, the pyloric "tumor" is withdrawn from the wound with gentle traction and a sero-muscular incision is made from the gastric antrum to the junction of the pylorus and the duodenum. This incision is "split" with the back of a knife handle until the two halves of the pyloric ring are separate from each other and move independently. In the event of a duodenal perforation, the perforation may be closed primarily or closed and a new pyloromyotomy performed.¹¹



Pic- 1-pyloromotomy



pic-2-muscle wasting

Patient and method

A prospective study of 24 cases of infantile hypertrophic pyloric stenosis in Salahaldeen government from February 2008-february 2011. All patients evaluated according to family history, sex, age, age at starting of vomiting, and hydration state. Examination done for any palpable mass and sign of dehydration, and muscle wasting, feeding test done for all patients. Patients admitted to hospital and investigations done which includes complete blood picture, blood urea, serum electrolyte. All patients send for ultrasound study of the pyloric canal to evaluate the length and thickening of the pyloric canal and consider as appositive study if the length more than 14mm and thickening more than 4mm. Some patients when there unclear diagnosis then send for barium study, depend on delay emptying of the stomach or string sign. Before surgery nasogastric tube gauge 8F inserted to prevent aspiration, at least 8hrs fasting before surgery. Under general anesthesia right supraumbilical transvers incision midpoint between the tip of nine rib and umbilicus, delivery of the mass outside the wound, Ramstad's pyloromyotomy done by separation of circular muscle without opening of the mucosa, 2mm from prepyloric vein, and care take not to perforate the duodenum and the stomach. when there is perforation primary repaired

done, all patients discharge in the next day except when there is perforation.

Result

A twenty four patients male and female managed, and all of them operated by Ramstad's operation 18(75%) male and 6(25%) was female patients, the beginning of vomiting vary from patient to another some patient start the projectile vomiting from the second week and some of them in the third week and all of them start in the first month of life, most patients have constipation 14(58%) male and 5(20.8%) female. Feeding test done for all patients which was positive in 16(66.6%) male and 4(16.6%) female. Mass was palpable in 13(54.1%) male and only three female (12.5%). Ultrasound send for all patients some of them informative and give the diagnosis more strength in 15(62.5%) and 4(16.6%) female and in the other patients send for barium study and give the diagnosis in 11(45.8%) male and 3(12.5%). All patients stop vomiting for about few days to one week after operation and start oral feeding within 24 hours after surgery except the patient with perforation 1(4.1%) when delay the feeding until the patient pass motion.

Table (1):-

Male

Femal

Sex	18(75%)	6(25%)
Palpable mass	13(54%)	3(12.5%)
Constipation	14(58.3%)	5(20.8%)
Wound infection	2(8.3%)	zero
Feeding test	16(66.6)	4(16.6%)
Ultrasound positive	15(62.5%)	4(16.6%)
Positive Barium study	11(45.8%)	3(12.5%)
Prforation	1(4.1%)	zero

Discussion

pyloric stenosis has been successfully treated for decades with Ramstedt's extramucosal pyloromyotomy which clearly gold standard treatment against which all other techniques must be compared. So highly effective is this simple, elegant and inexpensive operation that it has been described as one of the most easy and gratifying procedure performed by the pediatric surgeons and the most consistently successful operation ever described.¹¹The diagnosis of pyloric stenosis was confirmed on ultrasonography in all the cases. The sensitivity of this non invasive test is about 70% less than other report which record 90-100%.¹¹ this due to experience of the ultrasonographic personale . The mass palpable in 16 case(66%) and this go with castanon 1995 .¹² constipation most commonly in male 58% and this go with other study.¹³ wound infection occur in two cases 8% this is higher than other study¹³ mostly because of the use of catgut in wound closure. feeding test is positive in 66% male and 16% female this goes harris 2001.¹⁴ barium study positive in 45% male and 12% of female and this goes with lobe 1998.¹⁵ perforation is one of the complication

which may occure during surgery it occur in one case and suturing by primary suturing and another pyloromyotomy done from other side of the mass and this goes with other study .¹⁶ The frequency of post-operative vomiting is usually resolve spontaneously and this goes with other study .¹⁵

Conclusion

pyloromyotomy is a save simple operation with low complication with very good result for pyloric stenosis .investigation like ultrasound is very helpful in diagnosis and most of patent can discharge from hospital after 24h .

References

- 1.Schwartz MZ: Hypertrophic pyloric stenosis. In Pediatric Surgery. O'Neill JA, Rowe MI, Grosfeld JL, et al, eds:1111-1117
2. Grant GA, McAleer JJA: Incidence of infantile hypertrophic pyloric stenosis (letter). Lancet 1:1177, 1984
3. Klein A, Cremin BJ: Racial significance in pyloric stenosis. S Afr Med J 44:1130-1134, 1970
4. Ramstedt C: Zur operation der angeborenen pylorus stenose. Med Klinik 8:1702, 1912

5. Rothenberg SS: Laparoscopic pyloromyotomy: the slice and pull technique. *Pediatric Endosurgery and Innovative Techniques*. 1:39-41, 1997
6. Pollack WF, Norris WJ: Surgical History. Dr. Conrad Ramstedt and pyloromyotomy. *Surgery* 42:966-970, 1957
7. Tan KC, Bianchi A: Circumbilical incision for pyloromyotomy. *British Journal of Surgery* 73:399, 1986
8. Lamki N, Athey PA, Round ME, et al: Hypertrophic pyloric stenosis in the neonate ' diagnostic criteria revisited. *Can Assoc Radiol J* 44:21-24, 1993
9. Alain JL, Grousseau D, Terrier G: Extramucosal pyloromyotomy by laparoscopy. *Journal of Pediatric Surgery* 26:1191-1192, 1991
10. Tan HL, Najmaldin A: Laparoscopic pyloromyotomy for infantile hypertrophic pyloric stenosis. *Pediatric Surgery International* 8:376-378, 1993
11. Najmaldin A, Tan HL: Early experience with laparoscopic pyloromyotomy for infantile hypertrophic pyloric stenosis. *Journal of Pediatric Surgery* 30:37-38, 1995
12. Castañón J, Portilla E, Rodríguez E, et al: A new technique for laparoscopic repair of hypertrophic pyloric stenosis. *Journal of Pediatric Surgery* 30:1294-1296, 1995
13. Bufo AJ, Merry C, Shah R, et al: Laparoscopic pyloromyotomy: a safer technique. *Pediatric Surgery International* 13:240-242, 1998.
14. Harris SE, Cywes R: Laparoscopic pyloromyotomy. *Pediatric Endosurgery and Innovative Techniques* 5:405-410, 2001 15.
15. Lobe TE: Laparoscopic surgery in children. *Current Problems in Surgery* 35:859-948, 1998
16. Scorpio RJ, Tan HL, Hutson JM: Pyloromyotomy: comparison between laparoscopic and open surgical techniques. *Journal of Laparoendoscopic Surgery* 5:81-84, 1995