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Original Article

A PROSPECTIVE COMPARATIVE STUDY OF THE OUTCOME OF DOUBLE-Y PYLOROMYOTOMY (ALAYET'S PYLOROMYOTOMY) AND RAMSTEDT'S PYLOROMYOTOMY FOR THE SURGICAL MANAGEMENT OF INFANTILE HYPERTROPHIC PYLORIC STENOSIS

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Abstract

Background: Many innovations and approaches have been tried for the surgical management of Infantile Hypertrophic Pyloric Stenosis (IHPS) since Ramstedt's first successful surgery almost one hundred years ago. Here a new technique focusing on the pylorus which may offer better results for this common condition.

Methods: A prospective on going study of 20 patients with IHPS are carried out over a period of 15 months from July 2008 to September 2009. The patients are divided into 2 equal groups of 10 patients in each. The study is designed that all patients selected for study are optimized preoperatively with regard to hydration, acid-base status and electrolytes imbalance. All surgeries are performed after obtaining informed consent. Standard preoperative preparation and postoperative feeding regimes are used. The patients are operated on an alternate basis, i.e., one patient by double-Y pyloromyotomy(DY) and the next by a Ramstedt's pyloromyotomy(RP). Data on patient demographics, operative time, anesthesia complications, Postoperative complications including vomiting and weight gain are collected. Patients are followed up for a period of 3 months postoperatively. Statistical assessments are done by using Student test.

Results: No statistical differences are observed in patient population regarding age, sex, weight at presentation, symptoms and clinical condition including electrolytes imbalance and acid-base status. Significant differences are found in postoperative vomiting and weight gain. Data of post operative vomiting and weight gain in both groups are collected. Vomiting in double-Y(DY) pyloromyotomy group (1.23 ± 0.98 days) vs Ramstedt's pyloromyotomy (RP) group(2.950.99 days) p= 0.0094.Weight gain after 1st 10 days DY vs RP is (298 ± 57.94 gm vs193±19.8 gm p=0.0014), after 1 month (685±15.72 gm vs 498 ± 12.36 gm, p=0.0008), after 2months (670± 105.93 gm vs 455±79.76 gm, p=0.00013) and after 3 months (555±86.44 gm vs 435±47.43 gm, p=0.00098).No long-term complications are reported and no re-do pyloromyotomy is needed.

Conclusion: The double-Y pyloromyotomy seems to be a better technique for the surgical management of IHPS. It may offer a better functional outcome in term of postoperative vomiting and weight gain.

Key wards: Pyloric Stenosis, pyloromyotomy, double-Y pyloromyotomy, Alayet's pyloromyotomy.

Introduction:

Infantile hypertrophic pyloric stenosis (IHPS) is a common cause of gastric outlet obstruction in infants. Incidence is about 1-4/1000 live birth. Different treatment modalities and procedures have been tried for the management of this common condition. Simple observation, pharmacological interventions, endoscopic maneuvers and surgery have all been tried and tested. However, for practical purposes, surgery remains the mainstay for the management of infantile hypertrophic pyloric stenosis. Ramstedt's pyloromyotomy was described almost over a hundred years ago and to date remains the surgical technique of choice. Almost all innovations described so far have been the approach to the hypertrophied pylorus. Our technique deals directly with the pylorus.

Materials and Methods:

A prospective study is planned to make a comparison between Ramstedt's pyloromyotomy and our double-Y pyloromyotomy. The approval of the hospital ethics committee are obtained after a detailed discussion of the procedure and study design. A total of 20 patients

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with infantile hypertrophic pyloric stenosis are included for the period from July 2008 to September 2009.Patients with other congenital problems or comorbid medical conditions are excluded from the study and, additionally, patients who are operated by other surgeons in the department are included. In the end, only 20 patients are included in the study.

All patients selected for the study are optimized preoperatively with regard to hydration, acid-base status and electrolyte imbalance. Patients are divided into 2 equal groups, of 10 patients in each. Standard preoperative preparation and postoperative feeding regimes (1st feed 4 hours after surgery with dextrose water moving to half-strength milk and proceeding to full feeds within the first 24 postoperative hours) are used. All surgeries are performed after obtaining informed consent. Patients are operated on an alternate basis, i.e., one patient undergo double-Y pyloromyotomy and the next one by Ramstedt's pyloromyotomy. All patients are operated using the standard right upper quadrant (RUQ) transverse incision. Information on patient's demographics, operative times, anesthesia complications, complications, postoperative vomiting and weight gain is collected. Parents are provided with a vomiting record sheet and they record the number of vomits per day and for how long vomiting took place postoperatively, i.e., both the frequency and duration of vomiting are recorded. These records are analyzed to assess end point vomiting. Patients are followed up for a period of 3 months postoperatively. Data is plotted on Microsoft Excel and analyzed with SPSS version 15 (SPPS Inc., Chicago, IL, USA), using the Student's t-test. Results were expressed as mean ± SD.

Technique :

Ramstedt's pyloromyotomy have been done in the standard manner using the right upper quadrant transverse incision. In the double-Y pyloromyotomy (Alayet's pyloromyotomy), the incision is similar, i.e., a right upper quadrant transverse incision is used. The pylorus are delivered and controlled as usual. A straight incision is made along 70% of the length of the hypertrophied pylorus in the center. The sides are made like a V, each V representing the remaining 15% of the incision length, respectively. The final appearance of the incision resembled double-Y. The straight line is dilated using the reverse side of an artery forceps at its center. The apex of the V is also dilated on each side. Mucosal pouting is done and check is carried out for any perforation. A routine abdominal closure is done.

Results :

A total of 20 patients are included in the study. 10 under went Ramstedt's pyloromyotomy (RP) and 10 had a double-Y pyloromyotomy (DY).The operative time is the same and no intraoperative complications occurred. No wound infections are encounteredand no redo pyloromyotomies are needed. No significant statistical differences are found in the patient population with regard to age (DY Group 26.0 ± 4.7 days vs. RP Group 25.7 ± 3.5 days; p = 0.8209), sex (DY 3F/17M vs. RP 5F/15 M), weight at presentation (DY 3.04 ± 0.56 kg vs. RP 3.11 ±0.55 kg; p = 0.8413), symptoms and clinical condition including electrolyte imbalance and acid-base status (all patients are optimally corrected before proceeding to surgery). The groups are also equal in terms of anesthesia (general anesthesia with IPPV, inhalation induction with Sevoflurane 5% with N2O+ However a significant difference between DY vs. RP groups was noted with regard to vomiting and weight gain. Patients were followed up for a period of 3 months postoperatively. Vomiting in double-Y(DY) pyloromyotomy group (1.23 ± 0.98 days) vs Ramstedt's pyloromyotomy (RP) group(2.950.99 days) p= 0.0094.Weight gain after 1st 10 days DY vs RP is (298 ± 57.94 gm vs193±19.8 gm p=0.0014), after 1 month (685±15.72 gm vs 498 ± 12.36 gm, p=0.0008), after 2months (670± 105.93 gm vs 455±79.76 gm, p=0.00013) and after 3 months (555±86.44 gm vs 435±47.43 gm, p=0.00098).No long-term complications are reported and no re-do pyloromyotomy is needed and no anesthesia-related complications occurred.

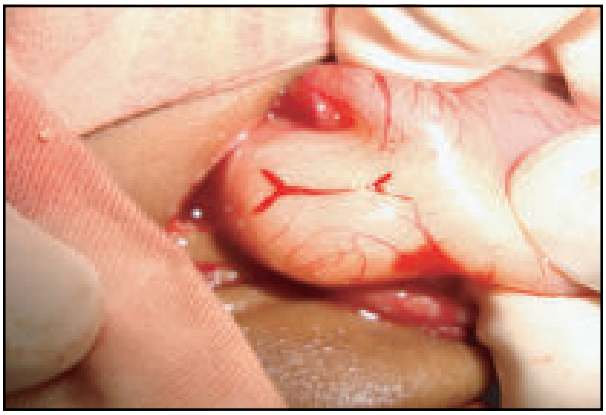

Fig.-1: *Incision for Alayet's pyloromyotomy along the hypertropic pylorus resembled to double-Y.*

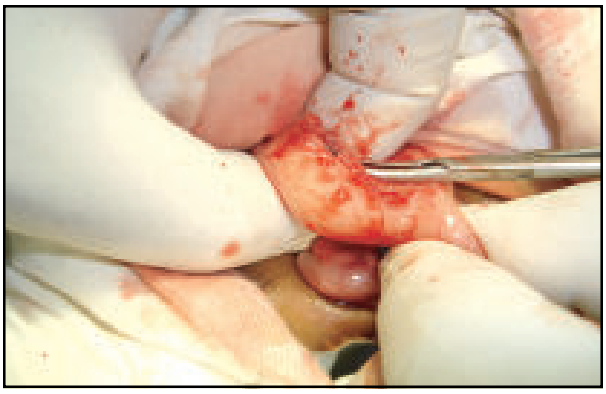

Fig.-2: *Retraction of seromuscular layer*

Fig.-3: *Pouting of mucosa after retraction of seromuscular layer*

Discussion

Infantile hypertrophic pyloric stenosis (IHPS) was first described by Blair in an autopsy specimen in 1717[1,2]. A few other reports were published over the next 100 years, but the first detailed account was given by Harold Hirschsprung in 1888[3]. IHPS remained an untreatable and usually fatal condition until 1907,when the first successful surgery was performed by Dufour and Fredet[4]. They suggested splitting the muscle and then suturing it transversely. However, in 1912, Ramstedt described his classical operation and stated that there was no need for muscle closure; his procedure has remained in general use up until the present day[5]. IHPS is a common cause of gastric outlet obstruction in infants. Its prevalence ranges from 1.5–4.0/1000 live births among whites, but the incidence is lower in black Americans and Asians. The male to female ratio is between 2:1 and 5:1[6]. The majority of cases present between the 3rd and 5th week of age, although some cases are diagnosed at birth [7] and some have even been diagnosed in utero [8]. The exact etiology is unknown and why this usually occurs in the first-born child is also a question that still awaits an answer. Persons with a positive familial history and certain ABO blood groups show a higher incidence. Among the acquired factors, the methods of feeding (breast vs. bottle) and seasonal variability have been implicated[9]. Prenatal prescription of macrolides has been implicated in the pathophysiology of IHPS [10]. Decreased numbers of interstitial cells of Cajal and heme oxygenase- 2 have been found in the smooth muscle of IHPS[11]. Increased vascularity has been shown to be an integral component of the pylorus in IHPS[12]. An increased amount of desmin in the hypertrophied pylorus may be the cause of incoordination of contraction and relaxation[13]. Management has come a long way from simple observation to treatment with i.v. atropine sulphate, although this is not favored by most centers[14]. Traumamyoplasty (crushing with Babcock forceps) has been carried out satisfactorily at few centers[15]. Endoscopic balloon dilatation and endoscopic pyloromyotomy using endoscopic electrosurgical needle or a sphincterotome[16] have also been described. However surgery remains the mainstay of the treatment and is safely and routinely done at most centers. The classical Ramstedt's procedure is conventionally done through a right upper transverse incision. Tan and Bianchi modified it to be done through a supra-umbilical semicircular incision for better cosmesis[17]. An umbilical sliding window technique introduced in Japan has reduced the incidence of postoperative wound infection further than the Bianchi procedure[18]. A right semicircular umbilical technique offered superior results, especially for large tumors, compared to Bianchi's procedure[19] with much less damage to the pylorus and superior results in terms of infection. A squeeze technique is useful especially for the delivery of large pyloric tumors through the supra-umbilical route[20]. Transumbilical pyloromyotomy has been described as an alternative to laparoscopy. Since a significant period of time pyloromyotomies have been carried out laparoscopically. This method has proved to be equally safe and efficacious compared to the open procedure.However in a meta-analysis, it was found that the open technique is superior to laparoscopy in terms of safety.This technique is unique in that it deals directly with the pylorus rather than the approach to the pylorus, which all previous methods have focused

on. In our study postoperative vomiting is significantly less in the double-Y group compared to the Ramstedt procedure group. The weight gain in our patients is comparable to that in a study done a few years ag.

Conclusion :

This technique deals with the pylorus rather than the approach to the pylorus. It seems to offer a better and wider opening of the pylorus by creating a wider opening of the pyloric canal at the ends with a wide angle compared to Ramstedt's pyloromyotomy where the ends are sharply narrowed. As the end force on the mucosa is divided into 2 directions it may be that the chances of perforation are lower. The method is suitable for both conventional and laparoscopic surgery. A double-Y pyloromyotomy (Alayet's pyloromyotomy) may offer a better functional outcome as seen by the lower frequency of vomiting in our patients. The increased weight gain in the double-Y group may also indirectly indicate a wider and more effective opening of both ends of the pyloric canal. However more studies need to be done on this technique to prove its efficacy and establish it as a standard technique for the future.

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