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Y-U ADVANCEMENT PYLOROPLASTY AS AN ALTERNATIVE TO TRANSVERSE PYLOROPLASTY TO RELIEVE PYLORIC STENOSIS IN DOGS

A. Safdar, M. Arif Khan, M. M. Ali*, M. H. Saleem and M. Ijaz

[1]Department of Clinical Medicine and Surgery, *Institute of Biochemistry and Biotechnology, University of Veterinary and Animal Sciences Lahore Pakistan.
Corresponding Author E-mail: muddassir.ali@uvas.edu.pk

ABSTRACT

Two commonly used surgical procedures i.e., transverse pyloroplasty and Y-U advancement flap pyloroplasty were compared to observe the relieve of pyloric stenosis in dogs. In this experimental design, twelve healthy mongrel dogs were used with further division of three groups, A, B and C comprising of four dogs in each group. The dogs of group A were subjected to Transverse pyloroplasty whereas Y-U advancement pyloroplasty was performed on dogs of group B. The group C was kept as control. Both surgical techniques were assessed by normal feeding pattern, vomiting, hematemesis, hemochazia, duration of external wound healing and contrast radiography. Results indicated that Y-U advancement flap pyloroplasty was superior to the transverse pyloroplasty in terms of simplicity, safety, maximal channel size with minimal operating time and better gastric emptying time.

Key words: Dogs, Pylorus, Pyloroplasty, Contrast radiography.

INTRODUCTION

The pyloric part comprises of almost one third of the stomach consisting of thin-walled pyloric antrum with multiple sphincter like loops of muscles associated with it (Budras, 1994). Pylorus plays its vital role as an anti duodenogastric reflux organ (Halfacree, 2010). The common surgical anomalies of pylorus includes the pyloric stenosis which results due to gastric and duodenal hypertrophy and this can lead to the gastric outflow obstruction (Hoya *et al*., 2009). Different surgical measures have been adapted to relieve pyloric stenosis in dogs i.e. pyloromyotomy, pyloroplasty (Transverse or Y-U advancement techniques) and partial or complete pylorectomy (Tomio *et al*., 2009) and these techniques are applied according to the cause of obstruction. Pyloromyotomy is indicated in case of congenital, non-inflammatory, non-hypertrophic stenosis while Transverse Pyloroplasty (Heineke-Mikulicz Procedure) is adopted to correct inadvertently penetrated mucosa. The Y-U advancement technique is considered to enlarge the pylorus lumen. Although, Y-U Advancement pyloroplasty is well established technique but evaluation and comparison have not been conducted actively (Imtiaz *et al*., 2012). The present project was designed to compare the two established techniques i.e. Transverse Pyloroplasty and Y-U Advancement pyloroplasty for the relief of pyloric stenosis in clinically normal dogs with special emphasis on the effectiveness of the procedures used in terms of easy approach, improving diameter of the pylorus, healing at the operation site and least post-operative complications of the procedures used.

MATERIALS AND METHODS

In this study 12 adult mongrel dogs were included which were divided into three groups comprising four dogs in each group. The dogs of group A were subjected to Transverse pyloroplasty whereas Y-U advancement pyloroplasty was done on dogs of group B. The group C was kept as control.

Anesthesia: Xylazine HCl 23.32mg/ml **(**Xylaz, Farvet Holland) was used as pre-anesthetic at a dose rate of 0.05mg/kg intramuscularly. The Thiopental Sodium (Pentothal sodium, Abbot Laboratories) was administered intravenously at the dose rate of 10-12 mg/kg body weight as a general anesthetic.

Surgical Intervention: In Transverse Pyloroplasty (heineke-Mikulicz Pyloroplasty), pylorus was exposed after supra-umbilical midline laparotomy in group A dogs. The external diameter of pylorus was measured to compare it with the post-surgical external diameter. Temporary stay sutures were applied on the antrum. A longitudinal incision was then made with the scalpel through the serosa, muscularis and mucosa into the gastric lumen. The stay suture at the broad end of the incision was pulled toward each other across the incision thus converting the longitudinal incision to a transverse one. In dogs of group B, Y-U Advancement pyloroplasty was performed. After the exposure of pylorus, the external diameter of pylorus was measured for comparison with the post-operative external diameter. Stay sutures were applied at cranial and caudal aspect of the proposed site of incision just to hold the stomach in position and also to avoid spillage of gastric content into

the abdominal cavity. Then a Y- shaped full thickness incision was made through the gastric and duodenal wall with the crux centered over the orad portion of the pylorus and the arms extending into the antrum parallel to lesser and greater curvature of stomach. The base incision was then extending 2-3cm abroad to the pylorus and the arms of Y were equal in length to the base (Fig 1).

Assessment of Techniques: After surgery the dogs were shifted to the recovery room to have an open-air respiration. Soon after the recovery they were shifted to the kennels of pet center where they remained postoperatively till the completion of study period. A thorough physical examination was performed to check normal feeding pattern, vomiting, hematemesis, hemochazia, and duration of external wound healing. Radiographic evaluation was done to study the gastric emptying time. Contrast radiography was performed at day 7^{th}, 15^{th} and 30^{th} day post-operatively

RESULTS

Normal Feeding Pattern and Vomiting Exhibition: The feeding pattern was accessed to ascertain any change in normal feed in-take post operatively. After 3^{rd} day of surgery, all the animals of group A and Group B were provided milk and bread as their normal food and found that all were taking it properly throughout the postoperative period. None of them exhibited vomitus during the post-operative period except one dog of group B which was then given Maxolon (Metoclopramide Hydrochloride, SmithKline Beecham Pharmaceuticals (Pvt) Limited) intravenously twice a day before feeding.

Hematemesis and Hemochazia: During the postoperative period, hematemesis and hemochazia was not observed in any experimental animal.

Duration of External Wound Healing (Skin Incision): The suture lines of all dogs were also dressed twice daily using pyodine solution and the site was bandaged to protect it from contamination.The skin incisions showed encouraging results in all dogs except the dog No. 4 of B group, in which a small wound developed at the sutures line.

Preoperative and Postoperative Diameter Evaluation: Evaluation of preoperative and postoperative diameter showed that the diameter was increased in dogs of group B as compare to dogs of group A (Table 1).

Radiographic Evaluation: The contrast radiographic study using barium meal was conducted to find out gastric emptying time and any post-operative complication i.e. leakage. The radiographs were taken after the administration of 60% solution of Barium sulphate. First radiograph was taken immediately after barium ingestion and then subsequent radiographs were taken until the barium completely left the stomach. Normally the stomach empties within 1-2 hours of barium administration. The radiograph of animals of group A showed an increase gastric emptying rate than normal animals (control group). There was marked increase in the gastric emptying time in all the members of group B then group A and C as shown in Table 2. No perforation and leakage was observed in any dog (Fig 2).

Table 1 Difference between preoperative and postoperative diameter (cm) in Group A & B

Dog No.	Group A			Group B		
	Preoperative	Postoperative	Difference	Preoperative	postoperative	Difference
1	3.2	4.1	0.9	3.3	5.8	2.5 *
2	3.4	4.4	1.0	3.6	6.3	2.7 *
3	3.3	4.8	0.9	3.8	6.5	2.7 *
4	3.9	4.3	1.0	3.7	6.4	2.7 *

* Statistically significant (P<0.05)

Table 2 Comparative Gastric Emptying Time (GET) in all groups.

Dog No.	Group A	Group B	Control Group
	GET	GET	GET
1	1hr 54 min	1hr 32 min	2hrs 01min*
2	1hr 43 min	1hr 27 min	1hr 59 min *
3	1hr 34 min	1hr 24 min	2hrs 33 min *
4	1hr 39 min	1hr 22 min	2hrs 29 min *

* Statistically significant (P<0.05)

Fig 1: Closure of Y shaped incision in to U shaped incision.

Fig 2: Showing the Stomach and intestine after 15 minute of Barium sulphate ingestion.

DISCUSSION

A number of extraluminal and intraluminal factors are responsible for pyloric stenosis, which often begins as spasm, then, its frequency leads to muscular hypertrophy and complete obstruction. In past, different procedures have been tried to relief pyloric stenosis in dogs like pyloromyotomy, pyloroplasty (Transverse or YU advancement techniques) and partial and complete pylorectomy (Slatter, 2003). But adaptability of the good procedure is of great concern according to the cause. Moreover, percentage of recovery can be improved by the use of best technique along with the choice of suturing material such as vicryl, which gives less inflammation as compared to catgut **(**Ozalp *et al*., 2005). In present study, none of the dogs showed vomiting except one dog of group A, who exhibited bilious vomits post-operative which represents the some chances of complication of vomiting after pylroplasty. Similar results have been documented by Kennedy *et al*. (2005) and Margallo *et al*. (2007). They reported the complication after pyloroplasty and noticed bilious vomiting less frequently. After pyloroplasty operations no significant complications have been observed regarding skin wound healing (Park, *et al*., 2007). In present case, the skin wound in one of dog may be due to any infection. There was an increase in diameter after performing pyloroplasty techniques in both groups but there was more increase in diameter in group B where Y-U advancement pyloroplasty was performed. The results showed that Y-U advancement pyloroplasty proved to be helpful in widening the pylorus with minimal postoperative complications. Similar results have also been reported by Tavakoli *et al***.** (2007) who described that this technique produced minimal complication, gastric drainage had been satisfactory and, in long term follow up, no ill effect had been seen for the presence of antral mucosa in the proximal duodenum.

Radiographs results showed that gastric emptying time was increased after Pyloroplasties procedures especially in case of Y-U advancement pyloroplasty than the control groups, in which no surgical technique was used. In the present study the gastric emptying time was found increased than that of control groups. Similar picture has also been depicted by Fujita *et al*. (2009). These results are very much similar to the results of Sanchez-Margallo *et al*. (2005) who measured the gastric emptying rate using barium sulphate mixed with dry kibble dog food following laparoscopic Ramstedt pyloromyotomy, conventional Ramstedt pyloromyotomy, or laparoscopic Heineke-Mikulicz pyloroplasty, and the conventional Heineke-Mikulicz pyloroplasty and indicated that pyloroplasty increases the rate of gastric emptying in dogs.

The results of present study and previous studies conducted at different times clearly indicate that both the techniques are effective as a treatment to pyloric stenosis but it has been deduced that at certain places like severe mucosal hyperplasia, mucosal hyperplasia with intramural cyst and or chronic inflammatory cell infiltration transverse pyloroplasty is not an effective procedure for drainage Zherlov *et al*. (2005). Also the previous studies indicate that the reoccurrence of the duodenal ulcer after transverse pyloroplasty is of prime importance (Soper *et al*., 1994), although no such complication was observed in the present study.

Conclusion: From the result of present study it is concluded that although both the techniques are equally effective with least post-operative complications and number of attractive features, including simplicity, safety, and maximal channel size with minimal operating time, but the Y-U Advancement Pyloroplasty has an edge over the Transverse pyloroplasty in terms of more increase in diameter of pylorus and better gastric emptying time.

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