

## COMPARATIVE EFFICACY OF Y-U ANTRAL ADVANCEMENT FLAP PYLOROPLASTY AND INVERTED PYLORUS DUODENAL PLASTY AS A RELIEF TO PYLORIC STENOSIS IN DOGS

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### ABSTRACT

Two established surgical techniques, Y-U antral advancement flap pyloroplasty and inverted pylorus duodenal plasty are used to treat the pyloric stenosis in dogs. The study was conducted on twelve healthy dogs of same age and body weight. The dogs were divided into three groups i.e. Group A, B and C comprising four animals each. The dogs in group A and B were subjected to Y-U antral advancement flap pyloroplasty and inverted pylorus duodenal plasty, respectively whereas the dogs in group C were kept as control. The evaluation of the procedures was done on the basis of clinical observation, gastric emptying time, contrast radiography and post euthanasia assessment. It was statistically proved that Gastric emptying time of group "B" was lesser than group "A". The efficacy of inverted pylorus duodenal plasty was better than Y-U antral advancement flap pyloroplasty in terms of convenience, short duration of operation, less post-operative complications, increased luminal diameter and better gastric drainage in short period of time.

**Key words:** Pylorus, stenosis duodenalplasty, pyloroplasty, dog.

### INTRODUCTION

The pylorus functions both as a sphincter and as an anti-reflux organ. Pylorus is mostly affected in case of gastric outflow obstruction which in result causes the hypertrophy and narrowing of pyloric canal. It becomes olive shaped, hard and firm (Zoe Halfacree, 2010). In case of gastric out flow obstruction or narrow luminal either whole or part of the effected pylorus is removed (Pruitt, 2000). For this, most commonly used surgical techniques used are Billroth 1 (Partial gastrectomy and gastroduodenostomy), Billroth 2 (Partial gastrectomy and gastrojejunostomy) and total gastrectomy. In the past, different surgical procedures have been tried to relief of pyloric stenosis in dog (Tomi *et al.*, 2009), but the choice is made according to the cause. Pyloromyotomy, pyloroplasty, transverse or Y-U antral advancement flap or inverted pylorus duodenal plasty surgical techniques may improve outflow in many cases of non malignant, non inflammatory, non ulcer related cause of retention or outflow obstruction having no visual mucosal hypertropic obstruction (Yoshiyuki *et al.*, 2009). Partial and complete pylorotomy seems to be very promising techniques in patients having firm and inflexible pyloric tissue or severe mucosal hypertrophy (Slatter, 2003).

The purpose of the present study was to compare the two established techniques i.e. Y-U antral advancement flap pyloroplasty and inverted pylorus duodenal plasty to treat the cases of pyloric stenosis in dogs.

### MATERIALS AND METHODS

A total of 12 adult mongrel dogs of either sex weighing about 15 to 20 kg were used. All dogs were from and around the Lahore area and kept at the kennels of Pet clinic of University of Veterinary and animal sciences Lahore, Pakistan during whole experiment procedure. Ultrasonography and radiography was carried out to investigate pylorus abnormalities. The dogs were allowed acclimation period of 10 days and were examined to assure their health status.

**Experimental Design:** The dogs were divided into three groups i.e. A, B and C comprising of 4 animals in each group. The Y-U antral advancement flap pyloroplasty was performed on dogs included in group A while the B was subjected to inverted pylorus duodenal plasty. The animals in group C were kept as control.

**Patient preparation and anesthesia:** Xylazine HCl 23.32mg/ml (Xylaz, Prix Pharma-ceutical, Pakistan) was used as preanesthetic at a dose rate of 0.05mg/kg intramuscularly. Animals were anaesthetized using Thiopentone sodium (Pentathol, Abbott laboratories, Pakistan) sodium, at a dose rate of 10-15mg / kg body weight intravenously. The animals were positioned on dorsal recumbency.

**Surgical Intervention:** In group "A" Y-U antral advancement pyloroplasty was performed, after supraumbilical midline laparotomy and exposure of stomach. A, U-shaped pedicle is made with full-thickness at the antral portion of the stomach. An incision was made in anterior surface of the duodenum. Three Gambee

sutures in the tip of the antral flap were placed to avoid inversion of tissue and for accurate apposition of the mucosal edges. To secure distal part of the duodenal incision three Gambee sutures were placed at the tip of the advanced antrum (Slatter, 2003).

In group B, the stomach was manipulated carefully and least traumatically by hooking a finger cranially and under the lesser curvature at the pyloric antrum. Then the pylorus was identified and exposed thorough the celiotomy incision. After the exposure of pylorus the external diameter of pylorus was measured to compare it with the post-surgical external diameter. Inversion of the edges were made at the antrum part of the pylorus. The incision was closed in three layers. The pyloric incision was closed with 2-0 delayed absorbable suture material i.e. Polyglactin 910 (Vicryl, Gohnsons & Gohnsons Pharma) in a full thickness, simple interrupted, appositional pattern, apposing first the centre of the incision. The linea alba was closed using 2-0 cat gut (Chromic cat gut, Gohnsons & Gohnsons Pharma) in simple interrupted pattern. The subcut incision was closed using 1-0 cat gut (Chromic cat gut, Gohnsons & Gohnsons Pharma) in simple continuous pattern. (Slatter, 2003).

**Post-operative care and evaluation:** The animals were kept under observation for period of 1 month post operatively. The two surgical procedures were compared on the basis of best effectiveness of the technique in restoring the gastric outlet obstruction, improvement in luminal diameter post-operatively, development of adhesions, ease in surgery, healing at the operation site and least post operative complications (Matthiesen *et al.*, 1985).

The efficacy of the procedure was ascertained on the basis of following parameters.

**Clinical observation:** Physical examination was done in terms of normal feeding, vomiting, melena and duration of external wound healing.

**Radiographic Evaluation:** Contrast radiography was performed for evaluation of both surgical techniques.

**Postmortem Examination:** Post-mortem was performed for the efficacy and evaluation of both surgical techniques.

**Statistical Analysis:** Statistically one way analysis of variance (ONE WAY ANOVA) and least significant difference test were used to evaluate the efficacy of both surgical techniques in all groups.

## RESULTS AND DISCUSSION

**Clinical Observation:** TPR (temperature, respiration and pulse rate) was monitored for all dogs on daily basis. Initially, in first two days of post-surgery, there was an

average increase in temperature in all dogs. The dipyrone was used to subside the temperature. The recorded TPR of all dogs is shown in table 1.

**Intra-Abdominal Leakage:** Intra-abdominal leakage was noted in dog No. 3 and 4 at the site of surgery. Where as other dogs in group A and B did not show any leakage. These dogs showed abdominal pain and arched back while sitting. The site was tender to touch.

**Abdominal Pain:** All the dogs showed normal pattern of sitting, standing and locomotion without showing any sign of pain after a week of surgery except dog No. 3 and 4.

**Color of Mucous Membrane:** The color of mucous membrane was found normal pink in all the dogs throughout assessment period.

**Wound Healing:** The wounds healed satisfactorily without any complications in all the animals except dogs No.3, 4 and 8. In dog No.4 skin suture dehisced and wound healed through second intention. The dog No.8 got pus on skin suture line which was recovered by the use of antibiotic Biocon (penicillin + streptomycin) where as dog No.3 died due to evisceration on 5<sup>th</sup> postoperative day. Statistical analysis showed that mean difference of external diameter of pyloric canal in group "B" was greater than group "A" it meant that the efficacy of inverted pylorus duodenal plasty technique was better than Y-U antral advancement flap pyloroplasty. Gastric emptying time period in group "B" was lesser than group "A" and "C" which has been depicted by mean difference values and mean plot graph.

**Bile Analysis:** The stomach contents from all the dogs were sent to laboratory. All these samples were found negative for bile.

**Contrast Radiography:** The animals were radiographed at eight weeks of surgery by giving them barium meal. The stomach was packed with 10% solution of barium sulphate and after 45 minutes the abdominal cavity was radiographed. The shadow of barium sulphate was present in pyloric region as well as *in* duodenum which showed patency of passage. The result of radiography were quite satisfactory in all dogs of group "A" and "B" except in dog No. 4 in which barium shadow was absent in pyloric region.

**Post Euthanasia Assessment:** Gross postmortem examination of group "A" and "B" was carried out at the end of second month. The result of necropsy findings were quite satisfactory except for dog No. 3 who died on 5<sup>th</sup> postoperative day showed evisceration due to dehiscence of sutures. Surgical site was approached by opening abdominal cavity. The remaining dogs of group "A" and "B" showed quite normal healing. There was no leakage and no bile staining of abdominal cavity. Pyloric

stenosis refers to a narrowing of the passage between the stomach and the small intestine. The pylorus is the passage between the stomach and the small intestine. Obstruction to the outflow of gastric contents into the duodenum in the dog is not an uncommon problem (Maloman *et al.*, 1994). More than 50% of gastric diseases, infection, ulcers and cancers originate in the pyloric and pre pyloric regions. Pyloric stenosis is very common in gastrointestinal tract and many surgical interventions have been used to relief this problem. There are different reasons of pyloric stenosis as muscular hypertrophy, mucosal hypertrophy and antral pyloric hypertrophy which are usually noticed in toy breeds of dog and resulting in chronic hypertrophic gastropathy (Walter and Matthiesen, 1993). Okuyama *et al.*, (1997) believed that pyloric stenosis lack receptors in the pyloric muscle that detect nitric oxide, a chemical in the body that tells the pylorus muscle to relax. As a result, the muscle is in a state of contraction almost continually, which causes it to become larger and thicker over time. It may take some time for this thickening to occur, which results in pyloric stenosis in some patients. In the past different surgical interventions have been used to repair the pyloric stenosis or gastric outflow obstruction i.e pyloromyotomy, pyloroplasty, partial or complete pylorotomy (Billroth 1) Slatter (2003), pyloroduodenotomy, Fredet-Ramstedt pyloromyotomy, antrectomy with gastroduodenostomy or gastrojejunostomy, Heineke-Mikulicz type pyloroplasty. It is

also found that in all these cases the percentage of recovery can be improved by the use of good suturing material like vicryl, which gives less inflammation as compare to catgut (Ozalp *et al.*, 2005). The dog No.3 and 4 in group "A" and dog No.8 in group "B" showed vomiting and similar findings were also noted by Margallo *et al.*, (2007), they reported the complications after pyloroplasty and noted billous vomiting less frequently. TPR were slightly increased in both groups "A" and "B" but became normal after few days. They performed pyloroplasties in different patients. Skin wound healed satisfactorily in all dogs of group "A". These results are in agreement with the result of (Tani *et al.*, 2006). They also evaluated Y-U in many patients indicated technique required little dissection, less time and few complications. Contrast radiography findings were matched with Tavakoli *et al.*, (2007). They used pyloroplasty in children because barrium was present in pyloric antrum and duodenum. Post euthanasia assessment in groups "A" and "B" showed that diameter of pyloric canal was increased and the same was documented by Park *et al.*, (2007). Gastric outlet obstruction was found in dog No.4 of group "B". In this case typical undigested food was present in vomitus 7 hours after eating. The vomiting was usually projectile on an account of incomplete obstruction where as in complete obstruction vomiting was severe and profuse; the same results have been reported by Takeshi *et al.* (2009).

**Table 1 Post-surgery TPR (Temperature, Respiration and Pulse rate) of all dogs of group A and B.**

Dog No.	Days	Group A			Group B		
		Temperature	Pulse rate	Respiration rate	Temperature	Pulse rate	Respiration rate
1	1	106.0 <sup>0</sup> F	(110/mint)	22	105.5 <sup>0</sup> F	(112/mint)	26
2	2	106.5 <sup>0</sup> F	(103/mint)	23	104.0 <sup>0</sup> F	(102/mint)	24
3	3	103.0 <sup>0</sup> F	(105/mint)	20	103.0 <sup>0</sup> F	(101/mint)	23
4	4	101.0 <sup>0</sup> F	(102/mint)	20	100.0 <sup>0</sup> F	(100/mint)	19

**Table 2 Difference between preoperative and postoperative diameter (cm) in Group A & B**

Dog No.	Group A			Group B		
	Preoperative	Postoperative	Difference	Preoperative	postoperative	Difference
1	3.5	4.4	1.1	3.4	5.2	1.8
2	3.6	4.3	0.7	3.8	6.5	2.7
3	3.9	4.6	0.7	4.0	6.3	2.3
4	3.2	4.4	1.2	3.9	5.6	1.7

\* P<0.05

As in this surgical intervention some salient features were found i.e., short operative time and wide pyloric channel reported by Soper *et al.* (1994). There was no case of duodenal ulcers in both groups the same was documented by the work of Emas and Eriksson (1992). Although, little work has been done on the use of

Y-U for treatment of different abnormalities of pylorus but it indicated its usefulness with less post-operative complications (Soper *et al.*, 1994). Gastric emptying had been prompt as determined by postoperative barium studies. Gastric emptying time was shorter in inverted pylorus duodenal plasty than Y-U Antral advancement

flap pyloroplasty, the same has been reported by Gonzalez *et al.*, (2003). The postmortem examination revealed no evidence of stricture formation and perforation in all the dogs except dog No.3 in group "A", these results are similar with the findings of Zherlov *et al.*, (2005).

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