

# STUDY OF ANATOMICAL VARIATIONS OF ANTERIOR NERVE OF LATARJET AND ITS CLINICAL SIGNIFICANCE – A CADAVERIC STUDY

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## ABSTRACT

**Background:** Highly selective or proximal gastric vagotomy is one of the definitive treatment for gastric ulcers. The results of this operation in comparison to truncal vagotomy is well appreciated by the surgeons. On the contrary incomplete and inadequate performance of this procedure results in recurrence of ulcer, post vagotomy diarrhoea and dumping syndrome. Knowledge about the normal and abnormal patterns of the anterior and posterior gastric nerves is imperative to the surgeons performing highly selective vagotomy. Most studies of this region have been performed on western population and the perspective of truncal and highly selective vagotomy is based on western literature only. However Indian studies regarding this one, are only few and far in-between.

**Aims & Objective:** To study the variations of anterior of Latarjet & its implication in surgical treatment of peptic ulcer.

**Materials and Methods:** This nature of study on Indian population in this part of the country is an initiative. 55 stomach specimens were utilized for the study. The present study was divided in to 3 parts: (i) Cadaveric specimens – 12 in numbers; (ii) Autopsy specimens – 40 in numbers; and (iii) Foetal Specimens – 3 in number. The anterior gastric nerve was dissected out from the level of commencement to the level of termination by dissection method. The branching pattern, plexus formation and crow's foot appearance at the level of termination of anterior gastric nerve were studied. Results of present study were statically analyzed & compared with the findings of previous research workers.

**Results:** The study of pattern of the anterior nerve of Latarjet in the present study showed wide variations in terms of branching pattern, plexus formation and crow's foot appearance.

**Conclusion:** The discussion emphasises the most important anatomical details relevant to the achievement of adequate highly selective vagotomy. Knowledge of these variations is of great importance for the surgeons performing highly selective vagotomy to achieve better results.

**Key Words:** Vagotomy; Selective & Highly-Selective Vagotomy; Truncal Vagotomy; Anterior Gastric Nerve

## Introduction

Surgical therapy for peptic ulcer began as an empiric extension of the procedures first used in the nineteenth century for gastric cancer. The technique of proximal gastric vagotomy represents the culmination of decades of surgical research and appears to have greatly improved the functional outcome of ulcer surgery. There currently exists no pharmacological agent that permanently controls the peptic ulcer diathesis.

Highly selective vagotomy is the newest addition to the armamentarium of definitive ulcer operations. This procedure limits vagotomy to the fundus of the stomach and preserves antral innervations, thereby avoiding the need for a drainage or resectional procedure. According to some studies sparing of antropyloric innervation results in near normal gastric emptying and with preservation of extragastric vagal innervations, the incidence of post vagotomy diarrhoea and dumping is minimal. The recurrence of ulcer was observed to be minimal.<sup>[1,2]</sup> The incidence of wound infection, anastomotic leakage and afferent or efferent limb obstruction are greatly reduced.

The success reported in early European series and the duplication of these promising results in prospective trials was reported.<sup>[3]</sup> The major issue concerning highly selective vagotomy is ulcer recurrence. There is compelling evidence that the success of the procedure in terms of ulcer recurrence depends primarily on the experience of the operator and knowledge of anatomy of gastric branches of vagus nerve in the abdomen. The present study was done to identify the anterior gastric nerve pattern in our population and to compare the results with western literature.

## Materials and Methods

The study was conducted in 55 specimens including 12 cadaveric, 40 autopsy and 3 foetal specimens. The study was conducted during the period 2007 to 2010 in the department of anatomy, AIIMS New Deldi. The specimens were acquired from hospital resources after obtaining necessary permissions from the concern department.

The collected cadaveric stomach specimens were washed thoroughly and dissected underwater to visualize the anterior gastric nerve, otherwise known as nerve of

latarjet. Serous layer of the stomach was dissected carefully to trace the nerve and care was taken not to injure the nerve and its branches. At the cardio oesophageal junction lower end of the left Vagus and its cardiac branches were visualized. The autopsy specimens were washed thoroughly in running water to remove the contents within it and to clean the surface. The collected specimens were immersed in 10% formalin solution for fixation of the tissues. Then under water dissection of the specimen was done. The fat over the surface of the stomach and along the lesser curvature was removed in piece meal, taking care to avoid damage to all neurovascular structures. The serosal layer of the stomach was dissected carefully to trace the anterior gastric nerve of Latarjet.

Foetuses were embalmed by injecting 10% formalin solution using 18 g needle for preservation and fixation. The abdomen was opened by midline incision from xiphisternum to pubic symphysis. Transverse incision was made at the lower end of midline incision and at the sub costal plane up to the midaxillary line. Peritoneal cavity was opened. Lesser omentum was cut closer to the liver and gastro phrenic, gastrosplenic ligaments were cut to release the stomach. Greater omentum was cut along the greater curvature of the stomach and the stomach was dissected. Then the specimen was dissected carefully and course of the anterior nerve of Latarjet and its branches were studied.

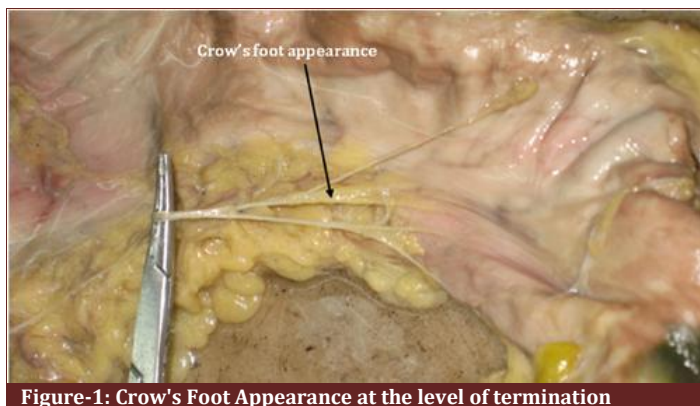


Figure-1: Crow's Foot Appearance at the level of termination

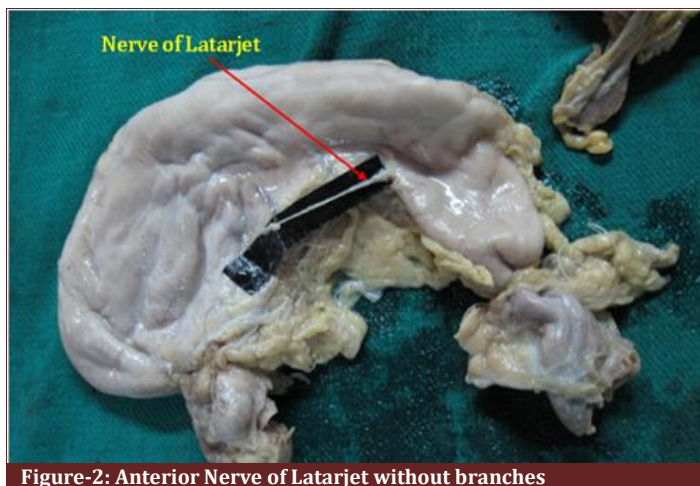


Figure-2: Anterior Nerve of Latarjet without branches

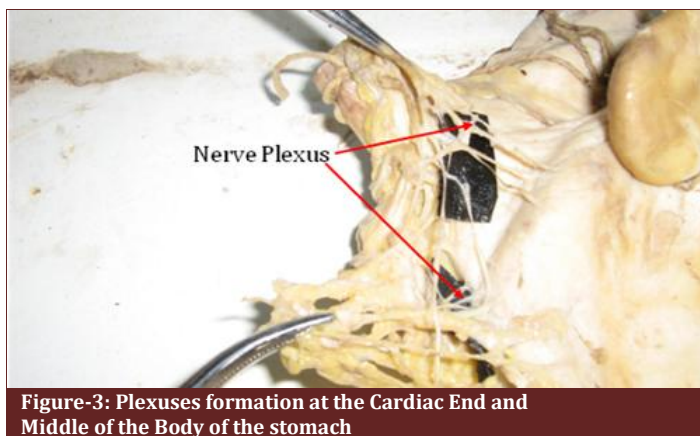


Figure-3: Plexuses formation at the Cardiac End and Middle of the Body of the stomach

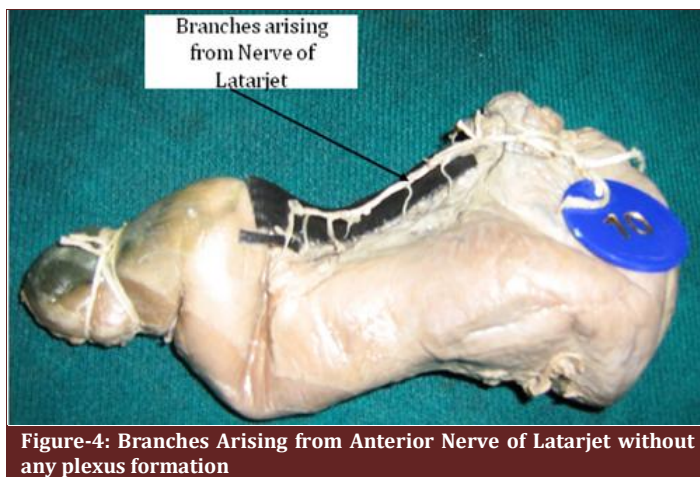


Figure-4: Branches Arising from Anterior Nerve of Latarjet without any plexus formation

## Results

11 of the 12 cadaveric specimens showed branching of the nerve of Latarjet with plexus formation over the anterior surface of the stomach. The nerve terminated at the level of incisura angularis forming a crow's foot appearance in those cases (Figure 1). In one specimen the anterior nerve of Latarjet alone was observed without branches and at its termination the usual crow's foot appearance was not observed (Figure 2). 35 of the 40 autopsy specimens showed branching and plexus formation of the anterior nerve of Latarjet over the anterior surface of the stomach (Figure 3). The remaining 5 specimens showed branching alone without plexus formation and crow's foot appearance (Figure 4). The level of termination of the nerve in all these cases were observed at the level of incisura angularis. All the fetal specimens studied were full term babies. The observations in the fetal specimens were unique. The anterior nerve of Latarjet alone was observed with its usual course, without branching and plexus formation and Crow's foot appearance was not seen at the level of termination (Figure 5).



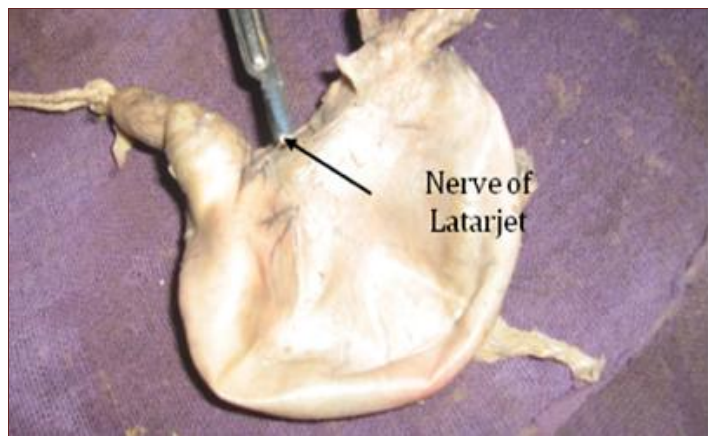


Figure-5: Foetal Specimen showing Anterior Nerve of Latarjet

### Discussion

The stomach is supplied by sympathetic fibres from the celiac plexus and para sympathetic fibres from the Vagus nerves. Sympathetic innervations (T5 – T12) of the stomach is through the splanchnic nerves and the cardiac plexus. The parasympathetic supply is derived from the anterior and posterior vagus nerves. The right and left Vagus nerves enter the abdomen through the oesophageal opening. The left and right vagi are now called as the anterior and posterior Vagus nerves. This change in terminology is due to the clockwise rotation of the stomach undergone during its development.<sup>[4]</sup>

The anterior Vagus nerve supplies the cardiac orifice and then divides near the upper end of the lesser curvature into gastric branches, pyloric branches and hepatic branches. The gastric branches, four to ten in number, run towards the anterior surface of the body and fundus and supplies it. The anterior gastric nerve is the major gastric branch that lies along the lesser curvature. This nerve is also called as anterior gastric nerve of Latarjet. The anterior gastric nerve ends at incisura angularis by forming a crow’s foot appearance. The posterior Vagus nerve divides to form gastric and celiac branches. Gastric branches supply the posterior surface of the stomach. The largest branch is called as greater posterior gastric nerve or posterior gastric nerve of Latarjet. This nerve ends at the angular notch. Celiac branches run along the left gastric artery and join the celiac plexus.

The results of our study demonstrated the presence of anterior nerve of Latarjet in all the specimens (100%). This coincides with the findings of Latarjet who also observed the presence of this nerve in all his specimens (100%).<sup>[5]</sup> Skandalakis reported the presence of the nerve in 96% of his specimens, Shuang Qui Yi in 70% and Jackson in 56% of cases only.<sup>[6-8]</sup> Skandalakis reported that the level of termination of anterior nerve of Latarjet was at incisura

angularis in 79% of his cases but Shuang Qin Yi observed the termination at this level in 40% cases only.<sup>[6,7]</sup> In the present study all the cases 100% terminated at the level of incisura angularis. This is similar to the observations by Latarjet.<sup>[5]</sup> By the present study it is evident that the surgical anatomy of the anterior nerve of Latarjet conforms to the pattern that exists in the western population.

McCrea, Loeweneck and Brizzi et al observed plexus formation over the anterior surface of the stomach.<sup>[9-11]</sup> Few other authors have reported absence of such a plexus.<sup>[12-15]</sup> 83.6% of our specimens showed formation of plexus over the anterior surface of the stomach. Andrews and TW Mackay observed the plexus formation in 58.6% of their cases, Brizzi et al observed in 20% of cases, whereas Dia A et al observed the same in 8% of cases only.<sup>[16-18]</sup>

The crow’s foot appearance at the level of termination was noted in 83.6% of our cases whereas Shuang Qin Yi observed this appearance in all his cases (100%).<sup>[7]</sup> In case of crow’s foot formation, branches may be given to the body of the stomach. In such cases failure to identify and division of this branch leads to recurrence of ulcer.<sup>[2]</sup> Therefore knowledge of crow’s foot formation and distribution of its branches is important for surgeons. In 9.09 % of our cases only branches were observed arising from the anterior nerve of Latarjet without any plexus formation. The same observation was also reported by Shuang Qin Yi, Skandalakis et al in their studies.<sup>[6,7]</sup> However literature regarding the branches of anterior nerve of Latarjet is scarce in Indian population.

Table-1: Various patterns observed in 55 specimens studied in the present study was compared with previous studies

Pattern Observed	Present Study	Previous Study
Presence of Anterior nerve of Latarjet	100%	Latarjet et al (1921): 100% Skandalakis et al (1986): 96%
Anterior nerve of Latarjet terminates at the level of incisura angularis	100%	Latarjet et al (1921): 100 % Skandalakis et al : 79% Shuang Qin Yi: 40%
Formation of plexus over the anterior surface of body of the stomach	83.6%	TW Mackay & PLR Andrews: 58.06%
Branches arising from the anterior nerve of Latarjet without plexus formation	9.09%	Skandalakis et al: 1986 Shuang Qin Yi: 1990
Formation of crow’s foot	83.6%	Shuang Qin Yi: 100%
Anterior nerve of Latarjet without branches and plexus formation	7.2%	Variation hitherto not reported

The results of present study were compared with previous studies (table 1). In highly selective vagotomy the branches of anterior and posterior gastric nerves are cut to reduce the gastric acid secretion. The branches are divided just before its level of termination to retain the antral nerve supply. Incomplete and inadequate vagotomy results in ulcer recurrence. Therefore knowledge of variants of

branching and disposition of the anterior gastric nerve decreases the risk of ulcer recurrence in highly selective vagotomy. In the present study the pattern of posterior gastric nerve of Latarjet has not been observed. The authors recommend further studies involving the innervation pattern of posterior gastric nerve.

## Conclusion

The study of pattern of the anterior nerve of Latarjet in the present study showed wide variations in terms of branching pattern, plexus formation and crow's foot appearance. Such variations have also been reported in western literature. The discussion emphasises the most important anatomical details relevant to the achievement of adequate highly selective vagotomy. Knowledge of these variations is of great importance for the surgeons performing highly selective vagotomy to achieve better results.

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