

## GASTROSTOMY- NAKAYAMA PROCEDURE HOW I DO IT

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**GASTROSTOMY- NAKAYAMA PROCEDURE - HOW I DO IT (Abstract):** Gastrostomy for feeding purposes are now performed transendoscopically, by fluoroscopic guidance, laparoscopy or by an abdominal midline incision. As endoscopy and radiology specialists and technique are often not wide available in community hospitals in our country, we intend to describe an alternative method. A single-wound, surgical access gastrostomy, performed with local anaesthesia and no need for endoscopic guidance, is described. Our results suggest that this new approach is effective and safe and avoids endoscopic guidance and general anaesthesia and also it can be used in patients with faringo-oesophageal obstruction.

KEY WORDS: GASTROSTOMY, STOMA CARE

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### DEFINITION

Gastrostomy is palliative surgical procedure for inserting a feeding tube through the abdomen wall and into the stomach. Gastrostomy is generally performed in a patient who are temporarily or permanently needs to be fed directly through a tube in the stomach.

First described in 1837, surgical gastrostomy was the mainstay of direct enteral feeding access for decades [1,2].

### SURGICAL ANATOMY

The stomach is the most dilated part of the digestive tube, and is situated between the end of the oesophagus and the beginning of the small intestine. It lies in the epigastric, umbilical, and left hypochondriac regions of the abdomen, and occupies a recess bounded by the upper abdominal viscera, and completed in front and on the left side by the anterior abdominal wall and the diaphragm.

The **shape and position** of the stomach are so greatly modified by changes within itself and in the surrounding viscera that no one form can be described as typical. The stomach presents two **openings**, two **borders** or **curvatures**, and two **surfaces** [1,3].

**Openings** - the opening by which the oesophagus communicates with the stomach is known as the **cardiac orifice**, and is situated on the left of the middle line at the level of the tenth thoracic vertebra. The short abdominal portion of the oesophagus (*antrum cardiacum*) is conical in shape and curved sharply to the left, the base of the cone being continuous with the cardiac orifice of the stomach. The right margin of the oesophagus is continuous with the lesser curvature of the stomach, while the left margin joins the greater curvature at an acute angle, termed the **incisura cardiaca**.

The **pyloric orifice** communicates with the duodenum, and its position is usually indicated on the surface of the stomach by a circular groove, the **duodenopyloric**

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**constriction.** This orifice lies to the right of the middle line at the level of the upper border of the first lumbar vertebra

**Curvatures** - the **lesser curvature** (*curvatura ventriculi minor*), extending between the cardiac and pyloric orifices, forms the right or posterior border of the stomach. It descends as a continuation of the right margin of the esophagus in front of the fibers of the right crus of the diaphragm, and then, turning to the right, it crosses the first lumbar vertebra and ends at the pylorus. Nearer its pyloric than its cardiac end is a well-marked notch, the **incisura angularis**, which varies somewhat in position with the state of distension of the viscus; it serves to separate the stomach into a right and a left portion. The lesser curvature gives attachment to the two layers of the hepatogastric ligament, and between these two layers are the left gastric artery and the right gastric branch of the hepatic artery [1].

The **greater curvature** (*curvatura ventriculi major*) is directed mainly forward, and is four or five times as long as the lesser curvature. Starting from the cardiac orifice at the incisura cardiaca, it forms an arch backward, upward, and to the left; the highest point of the convexity is on a level with the sixth left costal cartilage. From this level it may be followed downward and forward, with a slight convexity to the left as low as the cartilage of the ninth rib; it then turns to the right, to the end of the pylorus. Directly opposite the incisura angularis of the lesser curvature the greater curvature presents a dilatation, which is the left extremity of the **pyloric part**; this dilatation is limited on the right by a slight groove, the **sulcus intermedius**, which is about 2.5 cm, from the duodenopyloric constriction. The portion between the sulcus intermedius and the duodenopyloric constriction is termed the **pyloric antrum**. At its commencement the greater curvature is covered by peritoneum continuous with that covering the front of the organ. The left part of the curvature gives attachment to the gastrosplenic ligament, while to its anterior portion are attached the two layers of the greater omentum, separated from each other by the gastroepiploic vessels [1].

**Surfaces** - when the stomach is in the contracted condition, its surfaces are directed upward and downward respectively, but when the viscus is distended they are directed forward, and backward. They may therefore be described as anterosuperior and postero-inferior.

**Antero-superior surface** - the left half of this surface is in contact with the diaphragm, which separates it from the base of the left lung, the pericardium, and the seventh, eighth, and ninth ribs, and intercostal spaces of the left side. The right half is in relation with the left and quadrate lobes of the liver and with the anterior abdominal wall. When the stomach is empty, the transverse colon may lie on the front part of this surface. The whole surface is covered by peritoneum [1].

The **postero-inferior surface** is in relation with the diaphragm, the spleen, the left suprarenal gland, the upper part of the front of the left kidney, the anterior surface of the pancreas, the left colic flexure, and the upper layer of the transverse mesocolon. These structures form a shallow bed, the **stomach bed**, on which the viscus rests. The transverse mesocolon separates the stomach from the duodenojejunal flexure and small intestine. The postero-inferior surface is covered by peritoneum, except over a small area close to the cardiac orifice; this area is limited by the lines of attachment of the **gastrophrenic ligament**, and lies in apposition with the diaphragm, and frequently with the upper portion of the left suprarenal gland [1,4].

**Component parts of the stomach** - A plane passing through the incisura angularis on the lesser curvature and the left limit of the opposed dilatation on the greater curvature divides the stomach into a left portion or **body** and a right or **pyloric portion**. The left portion of the body is known as the **fundus**, and is marked off from the remainder of the body by a plane passing horizontally through the cardiac orifice. The pyloric portion is divided by a plane

through the sulcus intermedius at right angles to the long axis of this portion; the part to the right of this plane is the **pyloric antrum**.

If the stomach be examined during the process of digestion it will be found divided by a muscular constriction into a large dilated left portion, and a narrow contracted tubular right portion. The constriction is in the body of the stomach, and does not follow any of the anatomical landmarks; indeed, it shifts gradually toward the left as digestion progresses [1].

**Position of the stomach** - the position of the stomach varies with the posture, with the amount of the stomach contents and with the condition of the intestines on which it rests. In the erect posture the empty stomach is somewhat J-shaped; the part above the cardiac orifice is usually distended with gas; the pylorus descends to the level of the second lumbar vertebra and the most dependent part of the stomach is at the level of the umbilicus.

Examination of the stomach during life by x-rays has confirmed these findings, and has demonstrated that, in the erect posture, the full stomach usually presents a hook-like appearance, the long axis of the clinical fundus being directed downward, medialward, and forward toward the umbilicus, while the pyloric portion curves upward to the duodenopyloric junction [1,3,4].

**Vessels and nerves** - the arteries supplying the stomach are: the left gastric, the right gastric and right gastroepiploic branches of the hepatic, and the left gastroepiploic and short gastric branches of the lienal. They supply the muscular coat, ramify in the submucous coat, and are finally distributed to the mucous membrane. The arrangement of the vessels in the mucous membrane is somewhat peculiar. The arteries break up at the base of the gastric tubules into a plexus of fine capillaries which run upward between the tubules, anastomosing with each other, and ending in a plexus of larger capillaries, which surround the mouths of the tubes, and also form hexagonal meshes around the ducts. From these the **veins** arise, and pursue a straight course downward, between the tubules, to the submucous tissue; they end either in the lienal and superior mesenteric veins, or directly in the portal vein. The **lymphatics** are numerous: they consist of a superficial and a deep set, and pass to the lymph glands found along the two curvatures of the organ. The **nerves** are the terminal branches of the right and left vagi, the former being distributed upon the back, and the latter upon the front part of the organ. A great number of branches from the celiac plexus of the sympathetic are also distributed to it. Nerve plexuses are found in the submucous coat and between the layers of the muscular coat as in the intestine. From these plexuses fibrils are distributed to the muscular tissue and the mucous membrane [1].

## **SURGICAL PROCEDURE**

### *Position*

The patient is placed in supine position with table in reverse Trendelenburg position to allow the stomach to fall below the costal margin.

### *Operative Preparation*

The skin is prepared and draped in the routine and sterile manner for a left upper paramedian abdominal incision.

### *Anaesthesia*

When this procedure is the only operation a local anaesthesia is preferred. The area of incision is infiltrated with local anaesthetic and also the parietal peritoneum [5-9].

### *Details of the Procedure* [7,8]

#### **Step 1**

A 5 to 7 cm short left upper pararectal incision is made after infiltration with local anaesthetic (1% lidocaine). The skin is opened also the rectus abdominis muscle fascia, the muscle being divided in blunt manner. The posterior layer of the rectus muscle is incised.

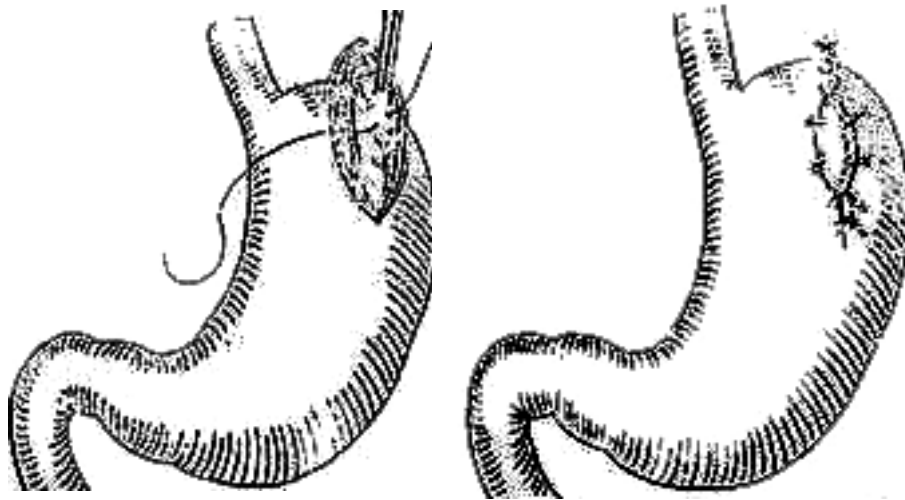
#### **Step 2**

Babcock forceps are used to grasp the stomach anterior wall at the cardiac portion of the stomach bring it to the surgical field. The site of the gastrostomy is marked with one 3-0 silk stitch. The cardiac portion of the stomach is brought up and fixed to the skin with Vicryl or 3-0 silk stitch (Fig. 1). The stomach is fixed first to the fascia and peritoneum with 4 stitches and to the skin with 4-6 stitches.

### **Step 3**

The gastrostomy is opened on the first or second day postoperatively a Pezzer catheter, no.16-18, being inserted into the stomach.

This technique is simple and the complications are rare, the leakage of the gastric content being rare due to the gastrostomy site.



**Fig. 1 Nakayama gastrostomy**

### **INDICATIONS**

As a general rule, enteral or parenteral feeding is advised when a patient is unable to eat for 7-14 days or longer. In the setting of a functional gut, enteral feeding is preferred to parenteral options. When the need for enteral feeding is anticipated to be 30 days or shorter, feedings through a nasogastric tube or a more distal nasoenteric tube are usually appropriate. Because such tubes are associated with considerable discomfort and because sinusitis and epistaxis are common complications, direct enteral access is preferred when feeding needs extend beyond 30 days [10].

### **CONTRAINDICATIONS**

The following are contraindications to percutaneous feeding tube placement: uncorrectable coagulopathy, unfavourable anatomy, massive ascites, gastric neoplasm, active gastritis or peptic ulcer disease, and gastric varices. Examples of unfavourable anatomy include interposition of the colon between the stomach and anterior abdominal wall, interposition of the liver between the stomach and anterior abdominal wall, a high (intrathoracic) position of stomach, and previous gastrectomy. Only uncorrectable coagulopathy and the absence of a safe access route are considered absolute contraindications to percutaneous feeding tube placement. The remainder of the listed conditions are considered relative contraindications [11].

## INTRAOPERATORY ACCIDENTS

Due to the procedure simplicity the accidents are extremely rare.

## INSTITUTING FEEDS

For gastrostomy tubes, a conservative approach has been to withhold feedings for 24 hours after tube placement. Then, after water is infused at a rate of 50 mL/h for 4 hours, tube feedings have been started at a rate of 50 mL/h. However, recent evidence indicates that direct gastrostomy tube feedings can be initiated 3 hours after tube placement, with the same degree of safety. Experience from large series indicates that feedings can safely begin 4 hours after tube placement. Results of smaller series suggest that the immediate initiation of tube feedings is also safe [11].

## COMPLICATIONS

The procedure is safe with rare complications such as, hematemesis due to a incorrect haemostasis during the surgical procedure.

**Catheter occlusion** - Occluded enteral catheters are occasionally opened by vigorous flushing or with Fogarty balloon catheters, but most require catheter exchange over a wire to restore patency [12]. In patients with recurrent and frequent tube occlusions, catheter care and tube choice should be reviewed carefully. These patients may benefit from more frequent and vigorous catheter flushing or from tubes with larger inner lumens.

**Catheter dislodgement** - Dislodged tubes should be replaced as promptly as possible to maintain feeding access in patients who are, by definition, nutritionally impaired. Dislodged gastrostomy tubes can be replaced successfully through mature tracts within 1 day and often as late as 5 days after dislodgement. Tubes can be used for feedings immediately after their successful replacement [12,13].

**Leakage at the tube site** - Patients perceive external pericatheter leakage as being particularly problematic. Excessive external tube motion may contribute to the expansion of the tube entry site, and external rings or fasteners may be helpful in this regard. Using larger catheters and the further inflation of intraluminal balloons may be useful in preventing the exit of enteric contents, as may the use of purse-string sutures [13].

**Tube-site infections** - Tube-site infections are not uncommon and can usually be treated if they are recognized early. Cellulitis is the most common catheter-related infection. Although enteral tube site infections are often polymicrobial, *Staphylococcus aureus* and beta-haemolytic streptococci are commonly involved organisms. In addition, fungal superinfection is not uncommon [12,13].

## PATIENT AND FAMILY COUNSELING

Whether to proceed with percutaneous enteral access is often a multidisciplinary decision, and the patient and his or her family must be involved. Depending on the underlying clinical problem and patient prognosis, the wishes of the patient and his or her family often weigh heavily on decisions regarding the appropriateness of enteral tube access. Many patients and families have strong opinions regarding the placement and use of feeding tubes and about their perceived role as life-prolonging measures. Physicians should provide the most objective medical advice possible to allow patients to make their own decisions. [14,15]

The patient and his family must be taught:

- how to care for the skin around the tube;
- signs and symptoms of infection;
- what to do if the tube is pulled out;
- signs and symptoms of tube blockage;

- how to empty (decompress) the stomach through the tube;
- how and what to feed through the gastrostomy tube;
- how to conceal the tube under clothing;
- what normal activities can be continued [15,16].

### **FOLLOW-UP CARE**

Tube sites should be checked on a daily basis for leakage or signs of infection. The patient and his or her family or health care provider can evaluate the site at the time of routine dressing changes. If gastropexy anchors are placed, the sutures are usually removed 10-21 days after initial tube placement.

Some physicians choose to bury these sutures below the skin surface rather than removing them at a later date. As long as tubes are functioning well, routine changes are not necessary. In patients with recurrent tube dislodgement or occlusion, scheduled tube changes may reduce the need for more urgent tube maintenance procedures. [16]

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