

# Laparoscopic Gastrectomy

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#### Topography

The stomach occupies most of the left subphrenic space, with its upper third in the left subcostal space. Five sixths of the stomach are located to the left of the midline. In general, the esophagogastric junction is at the level of the 12th thoracic vertebra and the pyloric junction is at the level of the first lumbar vertebra.

- 1. Esophagogastric junction
- 2. Ventral peritoneum
- 3. Phrenogastric ligament
- 4. Gastrosplenic ligament
- 5. Greater omentum (gastrocolonic ligament)
- 6. Lesser omentum



- Anatomical classification
- TNM classification

According to the TNM classification, the stomach is divided into 4 parts by the International Union Against Cancer (UICC, 1997). Ca: Cardia F: Fundus

- Co: Corpus
- A: Antrum
- P: Pylorus



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- Topography  $(\bullet)$
- Anatomical classification
- Vagal innervation
- Muscular layers

- Vagal trunk 1
- Vagal trunk 2

#### Anterior/left vagal trunk:

Gastric branches from the left and right vagal trunks are responsible for parasympathetic innervation of the stomach. With fetal gastric rotation, these come to occupy an anterior and posterior position near the lesser curvature. The anterior vagus nerve sends branches to the liver, gallbladder and gastric antrum in addition to gastric branches to the anterior wall of the upper and middle stomach that comprise the anterior nerve of Latarget.

- 1. Hepatic branch
- 2. Pyloric branch
- 3. Anterior nerve of Latarget



👽 Vagal innervation

Vagal trunk 2

Posterior/right vagal trunk:

The vagal trunks at the gastroesophageal level are often multiple, and the posterior trunk may lie behind the esophagus in the mediastinal tissues. For this reason, it is easily missed by the surgeon not completely familiar with a vagotomy. The posterior vagus nerve sends a large branch to the celiac plexus and the celiac branch in addition to small gastric branches to the posterior wall of the upper and middle stomach that comprise the posterior nerve of Latarget.

- 1. Celiac branch
- 2. Posterior nerve of Latarget





- Vagal innervation
- Muscular layers

The musculature of the stomach is grouped in 3 layers: longitudinal muscle in the outermost layer, oblique running muscle in the intermediate layer which is lacking in the antrum, and circular muscle in the innermost layer. Circular muscle thickens to about 5 mm in width to form the pyloric sphincter muscle. There is no sphincter muscle at the esophagogastric junction.

- 1. Longitudinal muscle
- 2. Oblique muscle
- 3. Circular muscle



#### Celiac trunk

- Lesser curvature 1
- Lesser curvature 2

Gastric arterial blood supply comes from the celiac trunk, which originates from the anterior aspect of the aorta above the superior aspect of the pancreas. The trunk divides into 2 pedicles each at the lesser and greater curvatures. The pedicles then join a wide anastomotic network that supplants vascular blood supply when one of the main trunks is either obstructed or ligated. The celiac trunk is 1 cm to 3 cm long and divides into 3 branches which include:

- 1. the left gastric artery
- 2. the common hepatic artery
- 3. the splenic artery.



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Lesser curvature 1

a Left gastric artery The left gastric artery originates from the celiac trunk in 90% of cases.

- b Left gastric artery
- In some patients, it originates:
- 1. directly from the aorta;
- 2. from the inferior phrenic artery;
- 3. from the gastrosplenic trunk;
- 4. from the gastrohepatic trunk.

#### c Left gastric artery

It completes an arch before joining and running along the lesser curvature 2 fingerbreadths below the cardia. It then divides into an anterior (a) and posterior (b) branch that both run down along the lesser curvature to join the terminal branches of either the right gastric artery or pyloric artery.



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- Lymph node system
- JGCA staging
- Regional lymph nodes
- UICC staging

JGCA (1998) classifies the regional lymph nodes of the stomach by anatomical location, numbering them from 1 to 20. Numbers 110, 111 and 112 of the lower mediastinal lymph nodes are also noted. These lymph nodes are grouped into the categories N1, N2, and N3, the combinations of each depending on the location of the primary tumor (upper, middle or lower stomach). The surgical intervention (lymph node dissection along with gastric resection) is described as D0-D3 resection. D0 implies no node dissection; D1, D2, D3 call for N1, N2, N3 dissection, respectively.





- Patient
- general anesthesia;
- orotracheal intubation;
- modified lithotomy position;
- nasogastric tube;
- supine position;
- arms at a right angle and legs apart (alternatively, arms alongside the body);
- reverse Trendelenburg position with a 10° or 30° tilt;
- dual-lumen gastric tube (used to totally empty the stomach);
- urinary catheter (optional).





- Patient
- 💿 Team
- Equipment
- 1. The surgeon stands between the patient's legs.
- 2. The first assistant stands on the patient's right.
- 3. The second assistant stands on the patient's left.

4. The scrub nurse stands behind and to the right of the surgeon.





#### Trocar placement

A: 12 mm, in the umbilicus B: 5 mm, right midclavicular line below the costal margin C: 5 mm, left midaxillary line below the costal margin D: 12 mm, left midclavicular line at the umbilicus E: 5 mm, right midclavicular line 2-3 cm above the umbilicus



## Port Position



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Lymph node dissection in relation to location of primary tumor				
Group	Localization of the primary tumor			
	ULM	LD, L	LM, M, ML	MU, UM
N1	1, 2, 3, 4, 5, 6	3, 4d, 5, 6	1, 3, 4sb, 4d, 5, 6	1, 2, 3, 4sa, 4sb, 5, 6
N2	7, 8a, 9, 10, 11p, 11d, 12a, 14v	1, 7, 8a, 9, 11p, 12a, 14v	8a, 8p, 9, 11p, 12a	7, 8a, 9, 10, 11p, 11d, 12a
N3	8p, 12b,p, 13, 16a2,b1, 19, 20	4sb, 8p, 12b, p,13, 16a2,b1	2, 4sa, 8p, 10, 11d, 12b,p, 14v, 16a2,b1	8p, 12b,p, 14v 16a2,b1 ,19 , 20
Distal metastasis (M)	Other regional nodes			
U = tumor of the upper third, M = tumor of the middle third L = tumor of the lower third, D = duodenum Distant metastasis (M) = lymph nodes regarded as distant metastasis (JGCA, 1998)				



#### UICC classification

T - Primary tumor

TX: Primary tumor cannot be assessed

T0: No evidence of primary tumor

Tis: Carcinoma in situ: intraepithelial tumor without invasion of the lamina propria

T1: Tumor invades lamina propria or submucosa

T2: Tumor invades muscularis propria or subserosa

T3: Tumor penetrates serosa (visceral peritoneum) without invasion of adjacent structures

T4: Tumor invades adjacent structures





#### Gastrocolic ligament

Gastroepiploic vessels

The procedure begins with the preparation of the greater curvature of the stomach. Using laparosonic coagulating shears (LCS), the gastrocolic ligament is divided approximately 3 cm from the gastroepiploic vessels in order to harvest all lymph nodes along these vessels (No. 4d and No. 4sb).





#### Left division

#### Gastroepiploic vessels

The dissection of the gastrocolic ligament is continued towards the gastrosplenic ligament. The left gastroepiploic vessels are crimped with double clips and divided at their origins. To allow subsequent anastomosis, the greater curvature is skeletonized from the distal end to the proximal end using LCS.





- Gastric vessels
- Duodenal transection

After the stomach is retracted with a grasper, the right gastric vessels are divided with double clips at their origin. This allows dissection of the suprapyloric lymph nodes (No. 5).





#### Duodenal transection

The duodenum is divided with a laparoscopic linear stapling device approximately 1 cm from the pylorus.





#### Dissections

#### Hepatic artery

- Left gastric vessels
- Right paracardial nodes

The common hepatic artery and the gastropancreatic fold, including the left gastric vessels, are then exposed by caudal retraction of the pancreas. The lymph nodes along the proper (No. 12a) and common hepatic arteries (No. 8) are dissected towards the celiac axis using LCS. Retraction of the common hepatic artery using a vessel loop facilitates this procedure.







#### Dissections

Right paracardial nodes

The lesser curvature of the stomach is skeletonized beyond the division line, allowing the dissection of the right paracardial lymph nodes (No. 1).



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### Complication

Bleeding
Abscess Formation
Herniation
Dumping syndrome
Afferent loop syndrome
Vitamins and Calcium Defficiency



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