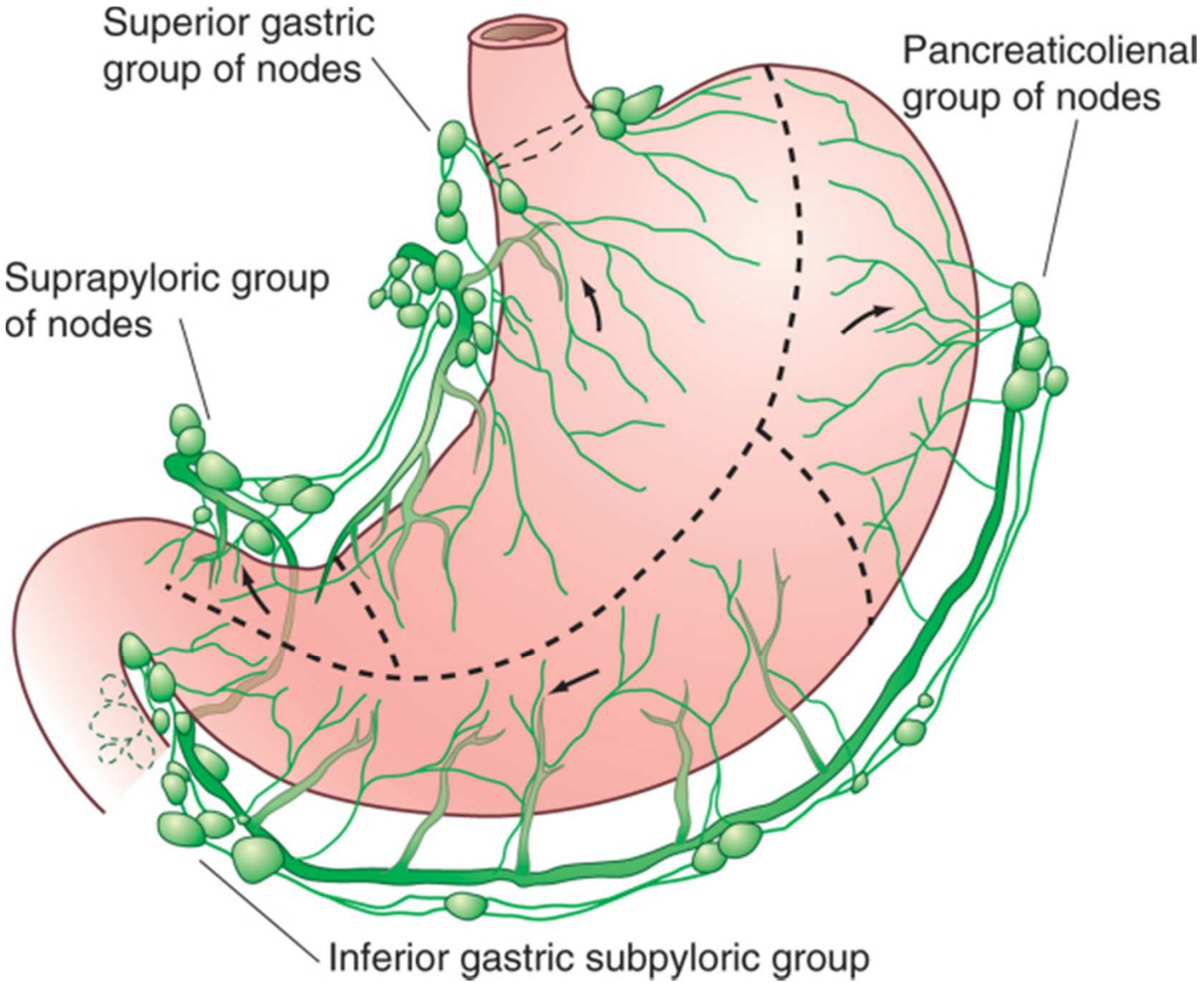
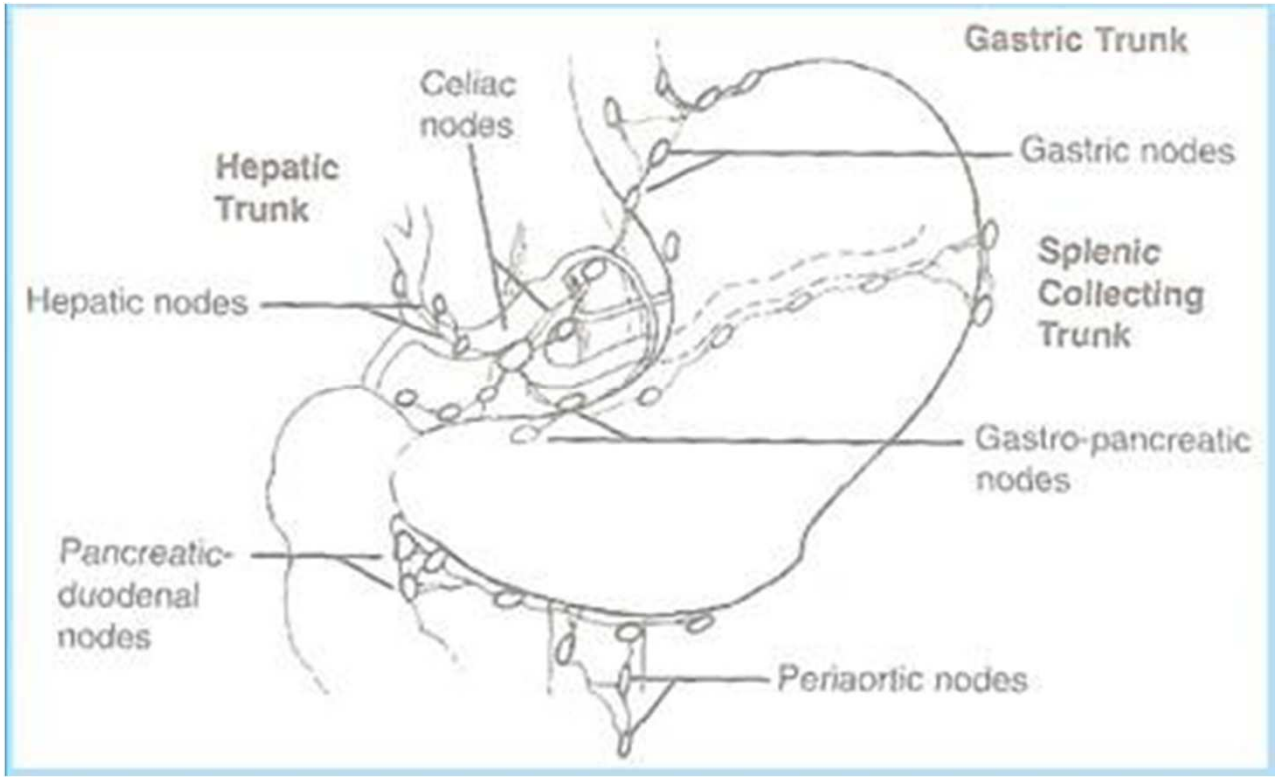
TUMOUR VOLUME DELINEATION IN GASTRIC CANCERS

DR G SELVALUXMY

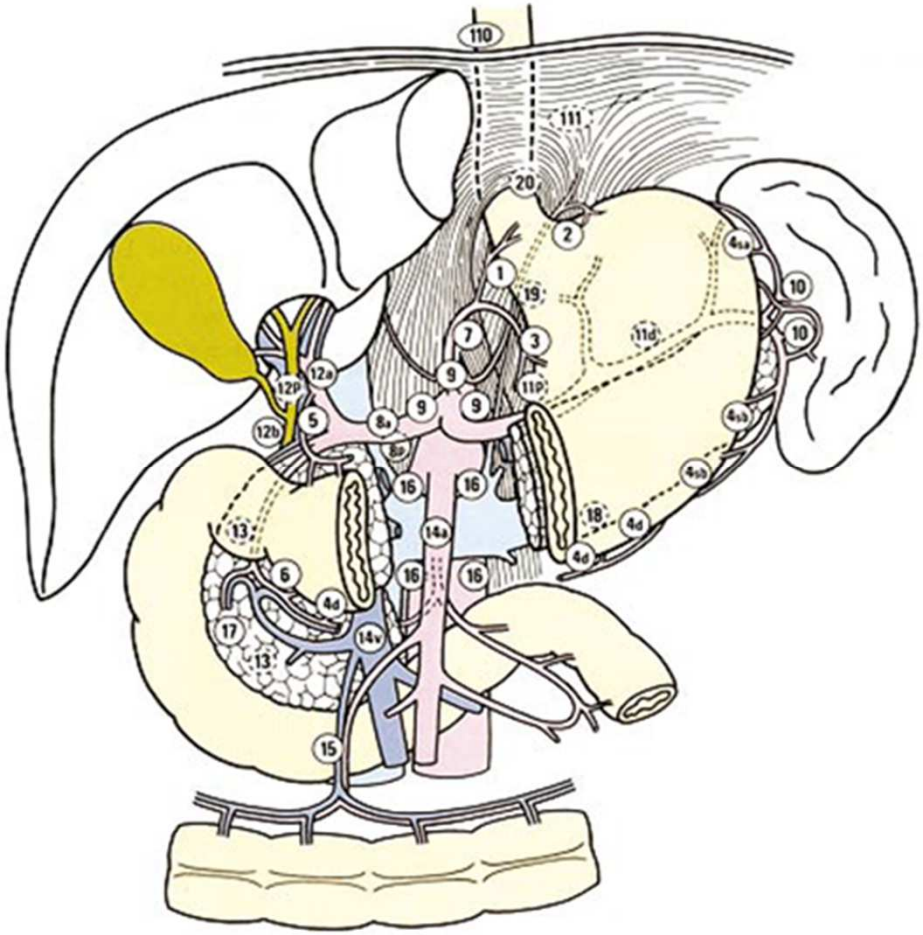
CANCER INSTITUTE

ADYAR. CHENNAI.


Superior gastric group of nodes
Pancreaticolienal group of nodes
Suprapyloric group of nodes
Inferior gastric subpyloric group


Gastric Trunk
Celiac nodes
Hepatic Trunk
Gastric nodes
Hepatic nodes
Splenic Collecting Trunk
Gastro-pancreatic nodes
Pancreatic-duodenal nodes
Periaortic nodes

Lymph node stations according to Japanese classification



- 1 Right paracardial, 2 Left paracardial,3 lesser curvature, 4sa short gastric vessels,4sb left gastroepiploic vessels,4d right gastroepiploic vessels,5 Suprapyloric, 6 Infrapyloric 7 left gastric artery,8a common hepatic artery (Anterosuperior group),8p common hepatic artery (Posterior group), 9 celiac artery,10 splenic hilum, 11p proximal splenic artery,11d distal splenic artery,12a hepatoduodenal ligament (along the hepatic artery), 12b hepatoduodenal ligament (along the bile duct),12p hepatoduodenal ligament (behind the portal vein), 13 posterior surface of the pancreatic head,14v superior mesenteric vein,14a superior mesenteric artery,15 middle colic vessels,16a1 aortic hiatus,16a2 abdominal aorta (from the upper margin of the celiac trunk to the lower margin of the left renal vein),16b1 abdominal aorta (from the lower margin of the left renal vein to the upper margin of the inferior mesenteric artery),16b2 abdominal aorta (from the upper margin of the inferior mesenteric artery to the aortic bifurcation),17 anterior surface of the pancreatic head,18 inferior margin of the pancreas,19 Infradiaphragmatic , 20 esophageal hiatus of the diaphragm,110 Paraesophageal LN in the lower thorax,111 Supradiaphragmatic 112 Posterior mediastinal

TARGET VOLUMES -PREOPERATIVE

Pre treatment diagnostic studies to identify tumor and pertinent nodal groups.

Risk of nodal metastases – site of origin of the primary tumor, including width and depth of infiltration of gastric wall.

TARGET VOLUMES –POST OPERATIVE

Pre treatment diagnostic studies and clip placement to identify the bed, anastomosis or stump - and pertinent nodal groups.

Remaining stomach treatment – depends on the perceived risk of local relapse in the residual stomach / likely normal tissues morbidity

Risk of nodal metastases – site of origin of the primary tumor, including width and depth of infiltration of gastric wall.

Pre-operative diagnostic or simulation scans can be fused with post-operative CT to facilitate localization of tumor bed

Surgical and pathological information must be reviewed at time of treatment planning

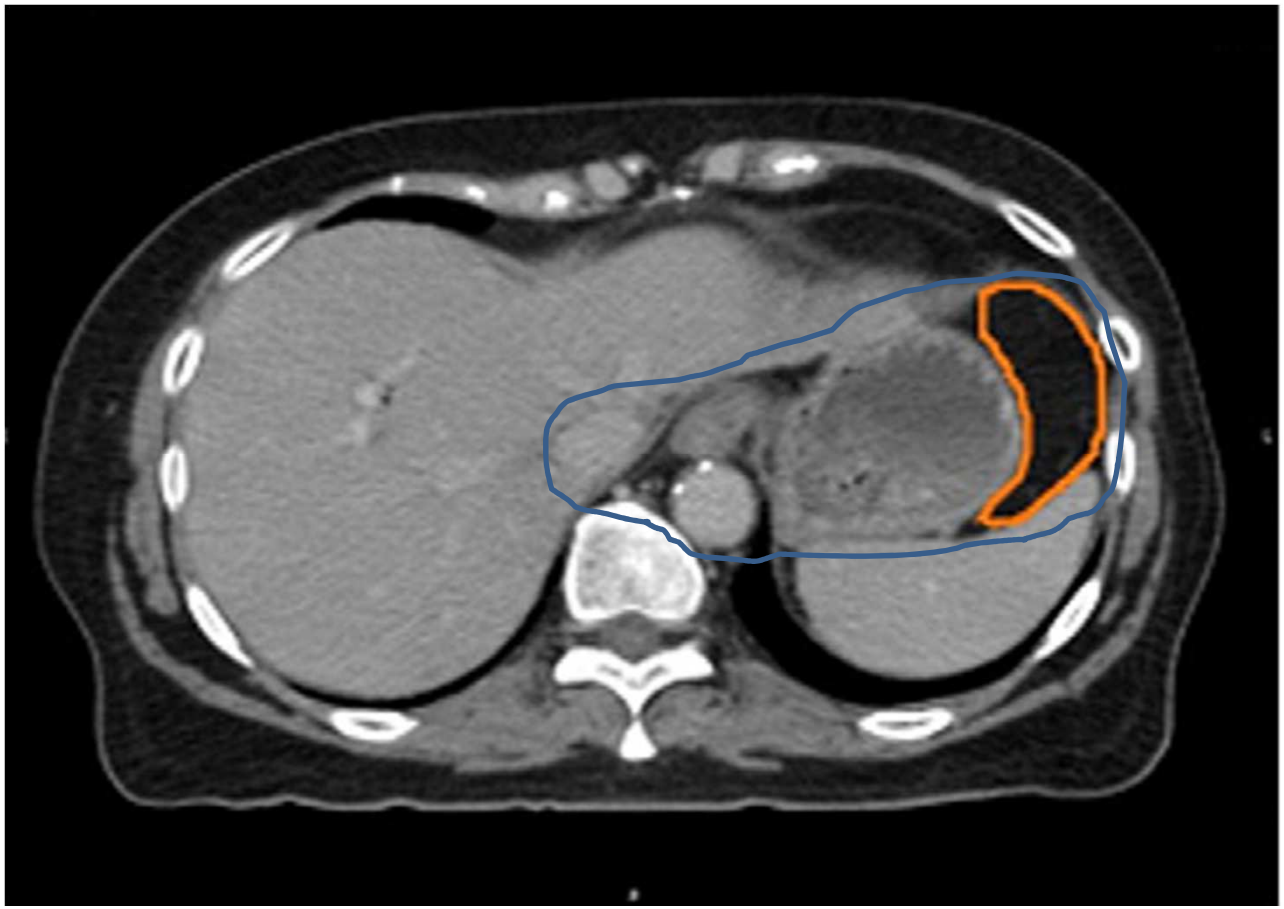
Tumor volume delineation

- Intact gastric anatomy
- Esophagogastrectomy
- Total gastrectomy
- Subtotal gastrectomy

Pre operative / intact gastric anatomy

- Patient with intact gastric anatomy.
- Moving in the cranial to caudal direction, the first perigastric LNs encountered are the left paracardial LNs
- The left paracardial LNs are anatomically defined medially by the gastric fundus, anterolaterally by the visceral peritoneum,posteriorly by the spleen, superiorly by the hemidiaphragm, and inferiorly by the greater curvature LNs.
- Generally, the region anterior to the gastric body is devoid of any nodal tissue.

Pre operative / intact gastric anatomy



Left paracardial

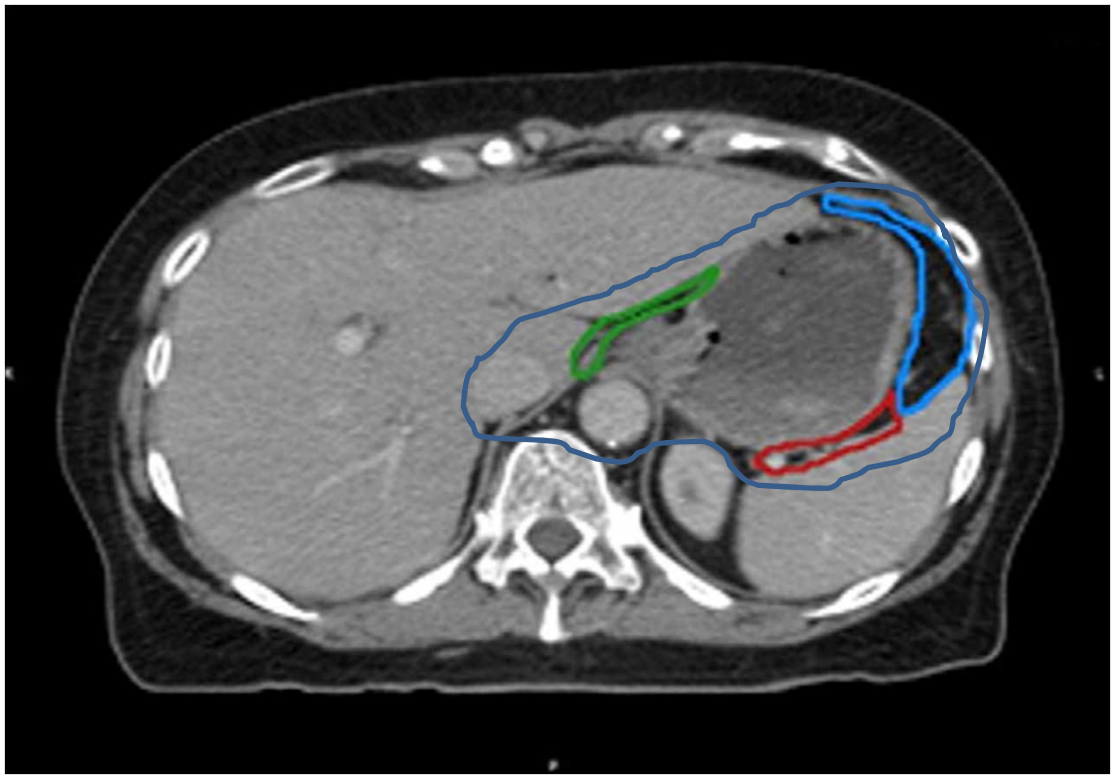
Pre operative / intact gastric anatomy

- Coming down, the next LNs encountered are the greater curvature LNs, splenic hilum LNs, and right paracardial LNs.
- The greater curvature LNs run along the short gastric vessels and both right and left gastroepiploic vessels, and they are bordered
- medially by the gastric body, anterolaterally by the ribs,and posteriorly by the spleen and splenic hilum LNs.

Pre operative / intact gastric anatomy

- Splenic hilum - Lying posterior to the greater curvature LNs, the nodal basin lying between the spleen and gastric body, bordered posterolaterally by the spleen, medially by the kidneys, extending inferiorly to cover all of the splenic hilum vasculature.
- Right paracardial LNs can also be identified, representing the narrow anatomic space that lies between gastric cardia and liver, extending posteriorly to the aorta and inferiorly to drain into the lesser curvature LNs at the level of the gastric body.

Pre operative/intact gastric anatomy

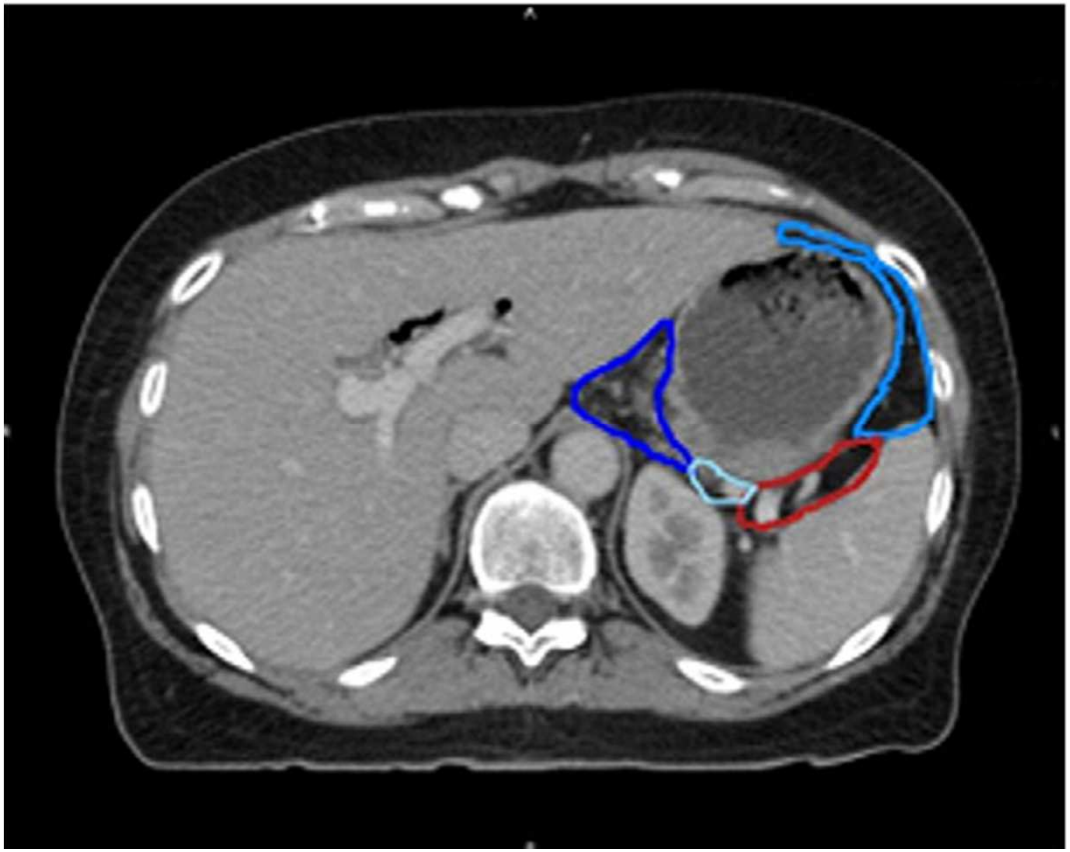


greater curvature (blue), splenic hilum (brown), right paracardial (green)

Pre operative / intact gastric anatomy

- lesser curvature and splenic artery LNs in relation to greater curvature and splenic hilum LNs.
- The lesser curvature LNs are defined superiorly by the right paracardial LNs, anteromedially by the liver, inferomedially by the suprapyloric LNs, laterally by the gastric body, and posteriorly by the kidney.
- The splenic artery LNs surrounds the splenic artery,It is bordered anteriorly by the posterior aspect of the gastric body,posteriorly by the left kidney, laterally by the splenic hilum LNs, and medially by the celiac axis LNs.

Pre operative / intact gastric anatomy

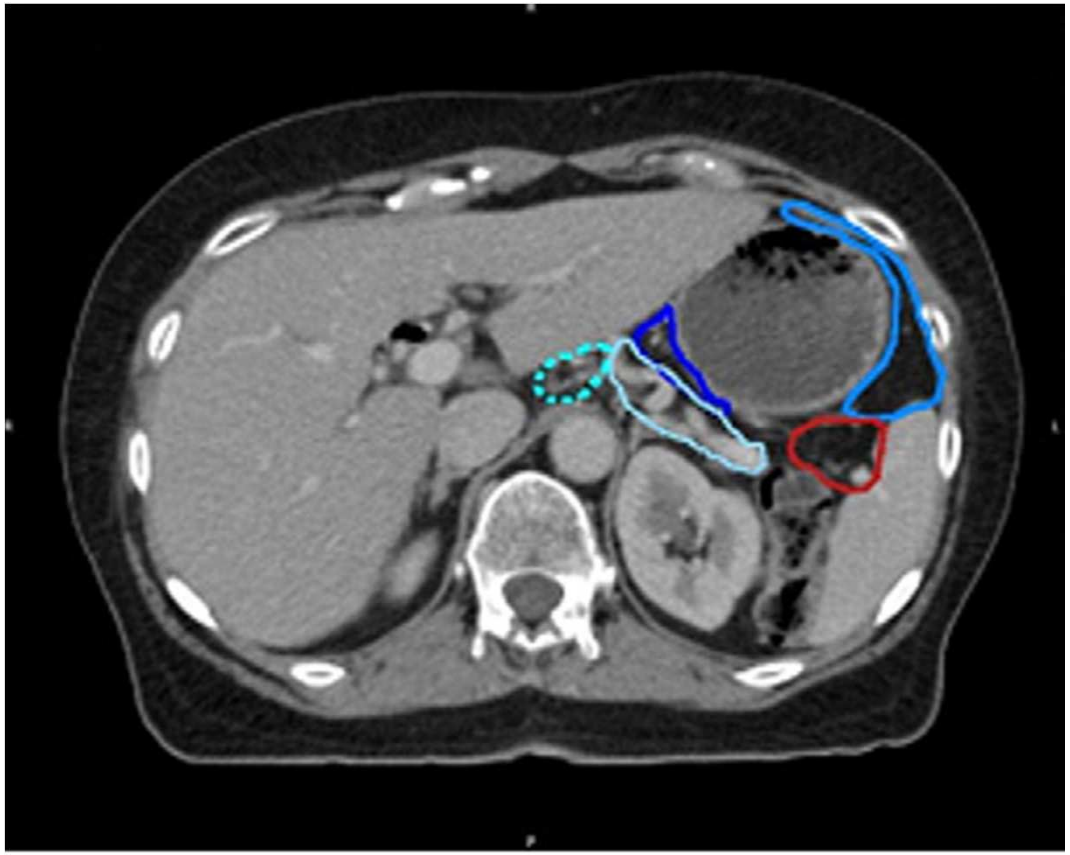


greater curvature (blue), lesser curvature (dark blue), splenic (sky blue), splenic hilum (brown)

Pre operative / intact gastric anatomy

- The left gastric LN station is defined as regional tissue surrounding the left gastric artery, starting inferiorly from its origin of the celiac axis to superiorly, running along the superior portion of the lesser curvature, where these LNs merge with the lesser curvature LNs.
- The left gastric LN station is bordered medially by the liver, superolaterally by the splenic artery LN basin, and inferolaterally by the celiac LNs.

Pre operative / intact gastric anatomy

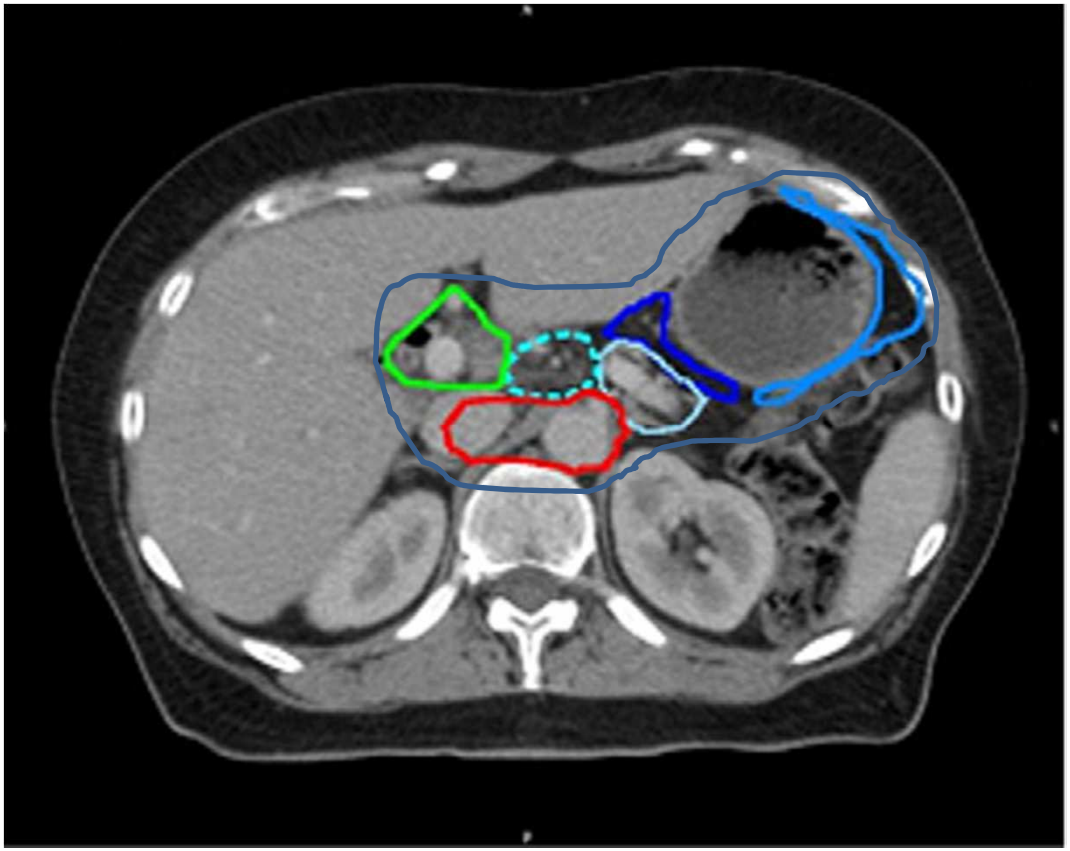


greater curvature
(blue), lesser curvature (dark blue), splenic (sky blue), splenic hilum (brown), left gastric (dashed)

Pre operative / intact gastric anatomy

- The hepatoduodenal LNs lie along the proper hepatic artery,common bile duct, and the portal vein, extending superiorly from the under surface of the liver to the superior portion of the duodenum inferiorly.
- The paraortic LNs are located within the region between and immediately adjacent to the aorta and inferior vena cava.
- Paraortic LNs starts 5-mm below the origin of the celiac axis.

Pre operative / intact gastric anatomy

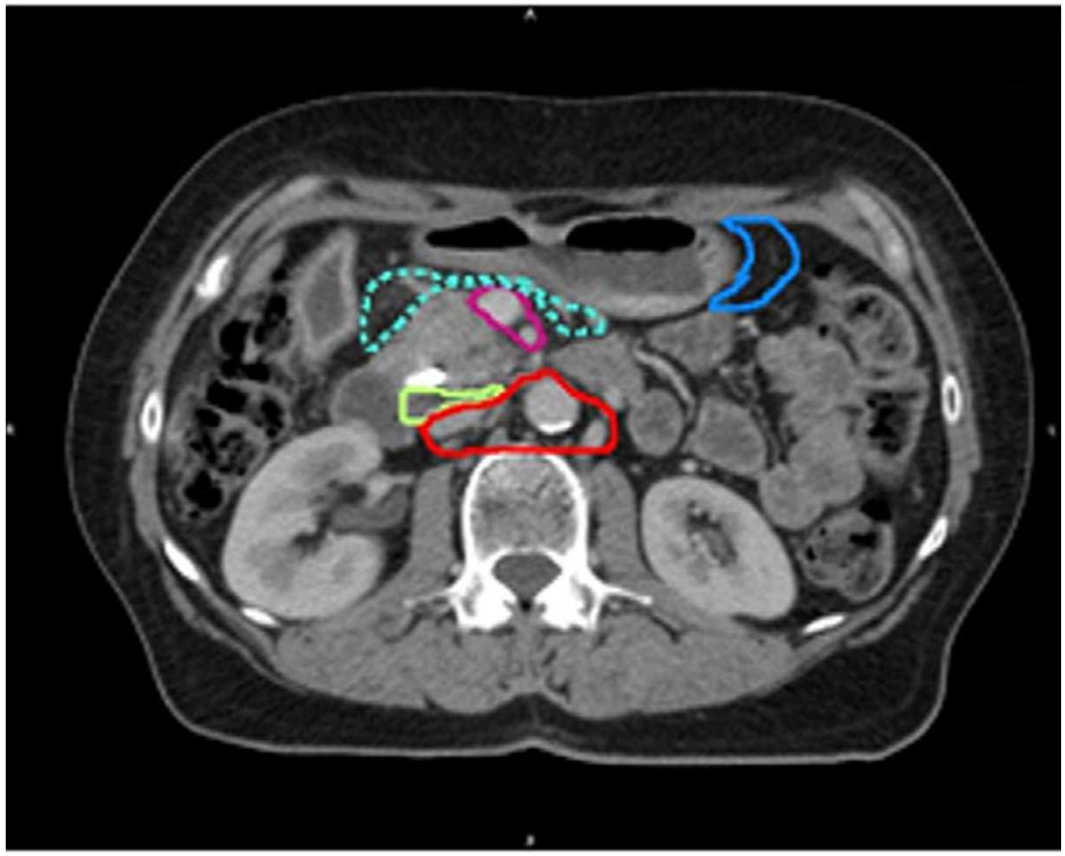


greater curvature
(blue), lesser curvature (dark blue), splenic (sky blue), left gastric (dashed), paraortic (red), hepatoduodenal (green)

Pre operative / intact gastric anatomy

- Common hepatic LNs are identified by first identifying the common hepatic artery, which terminates to form the proper hepatic artery and gastroduodenal artery.
- This is bordered posteriorly by the paraortic LNs, posteromedial by the celiac LNs, anteriorly by the liver,anteroinferiorly by the suprapyloric LNs, and laterally by the hepatoduodenal LNs.

Pre operative / intact gastric anatomy

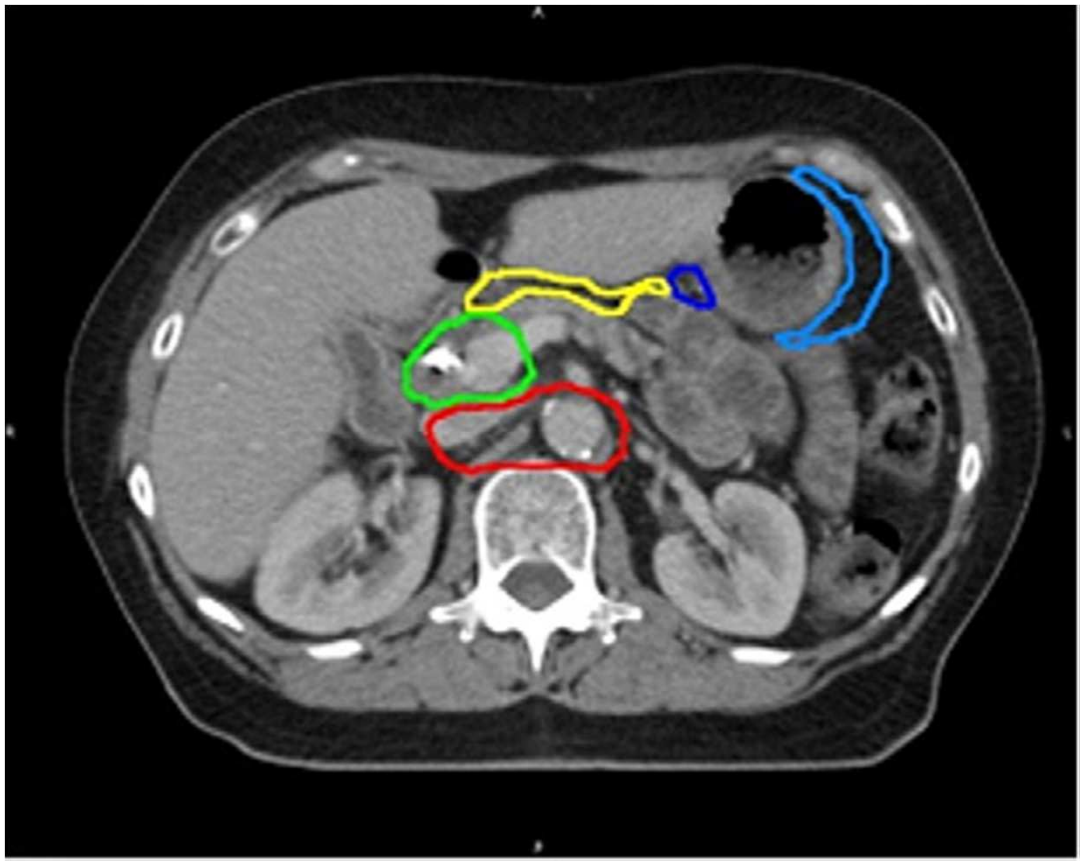


greater curvature (blue), paraortic (red), hepatoduodenal (green), common hepatic (dark purple),

Pre operative / intact gastric anatomy

- Suprapyloric LNs lie directly superior to the gastric pylorus.
- The common hepatic LNs flow into the suprapyloric LNs, then flow leftward to join up with the lesser curvature LNs.
- These are bordered anteriorly by the left lobe of the liver, posteriorly by the pancreatic body,and to the left by the inferior portion of the lesser curvature LNs.

Pre operative / intact gastric anatomy

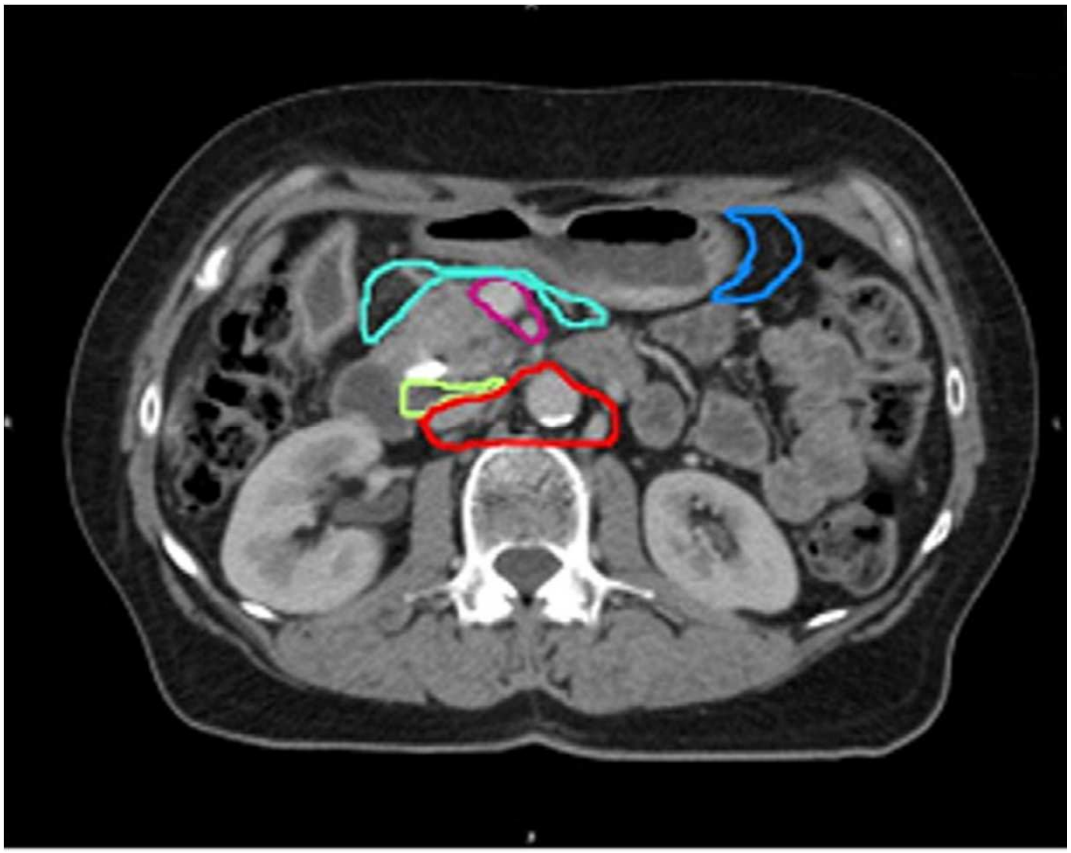


greater curvature (blue), lesser curvature (dark blue), paraortic (red), hepatoduodenal (green), suprapyloric (yellow)

Pre operative / intact gastric anatomy

- The infrapyloric LNs lie immediately inferior to the gastric pylorus and anterior to the pancreatic head and superior mesenteric vessels.
- The posterior pancreatic LNs lie immediately posterior to the pancreatic head and anterior to the paraortic LNs.
- The superior mesenteric LNs reside anteriorly along the surface of the pancreatic head and neck.

Pre operative / intact gastric anatomy



greater curvature (blue), paraortic (red), pancreatic (green), superior mesenteric (violet),
infrapyloric (light blue)

Esophagogastrectomy

After esophagogastrectomy

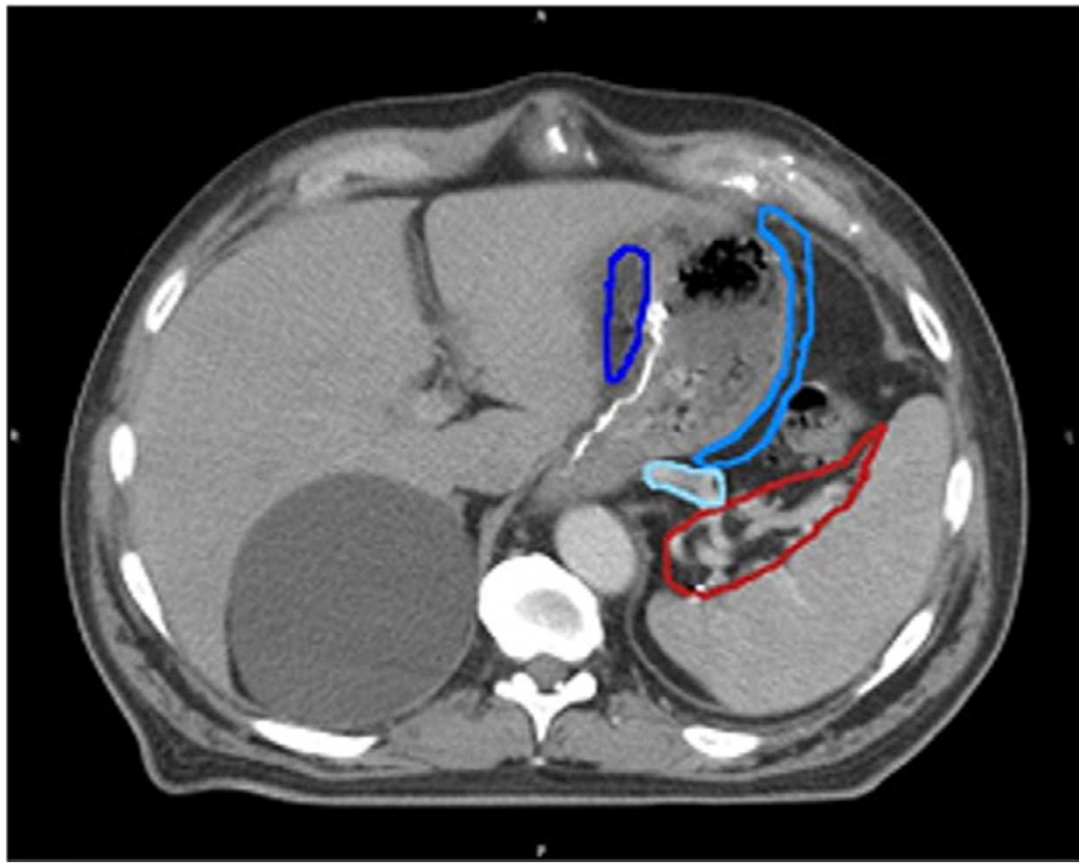
- It is difficult to radiographically define paracardial LN stations after an Ivor-Lewis esophagogastrectomy.
- Although the L and R paracardial and lesser curvature LN tissue may be completely dissected in the formation of a gastroesophageal anastomosis, there may still be nodal tissue here as evidenced by anastomotic recurrences which may occur.

- At the transition of the gastric fundus and gastric body, the greater and lesser curvature LN lie laterally and medially,to the stomach.

After esophagogastrectomy

- The splenic artery is not usually dissected.
- The left gastric artery is ideally taken at its origin.
- Kocher maneuver could have been performed such that the suprapyloric and infrapyloric nodes by be shifted medially and superiorly.
- A Kocher maneuver is a surgical maneuver in which the duodenum and head of the pancreas are mobilized from their retroperitoneal attachments.
- This allows the distal gastric remnant to more easily reach the mediastinum for anastamosis to the transected esophagus

Esophagogastrectomy

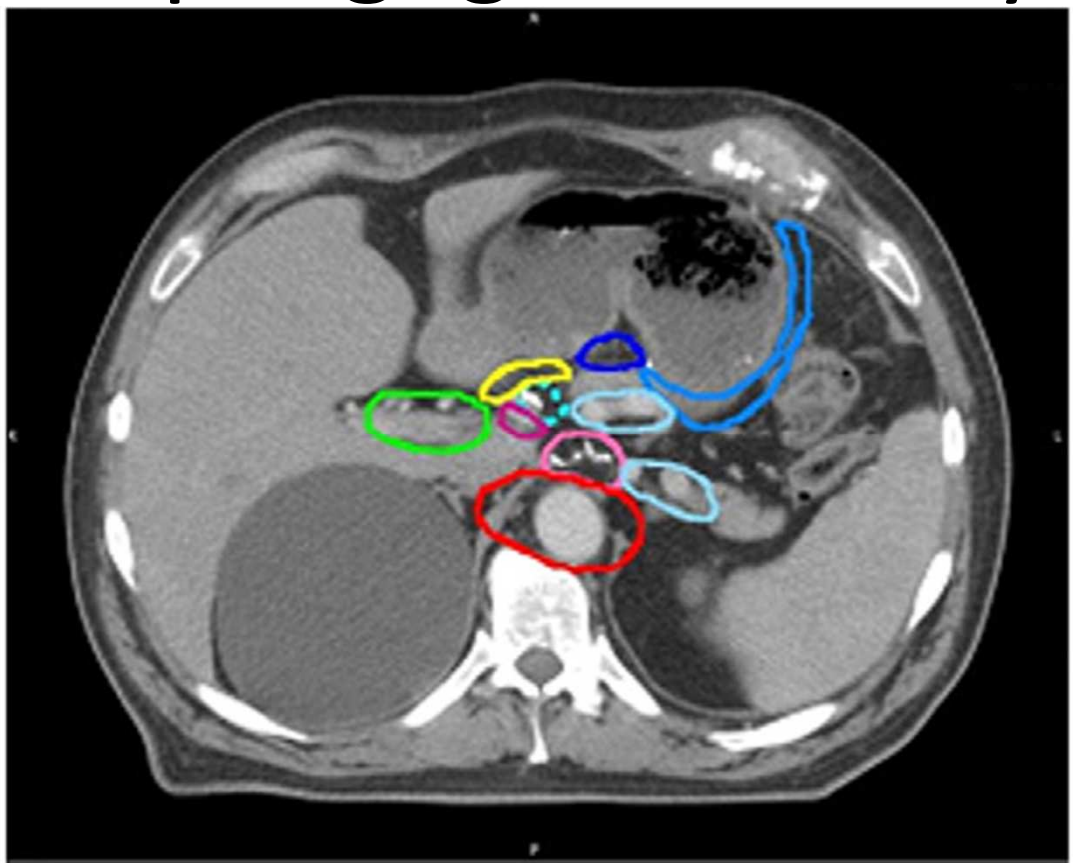


greater curvature (blue), lesser curvature(dark blue),splenic hilum (brown), splenic(light blue),

After esophagogastrectomy

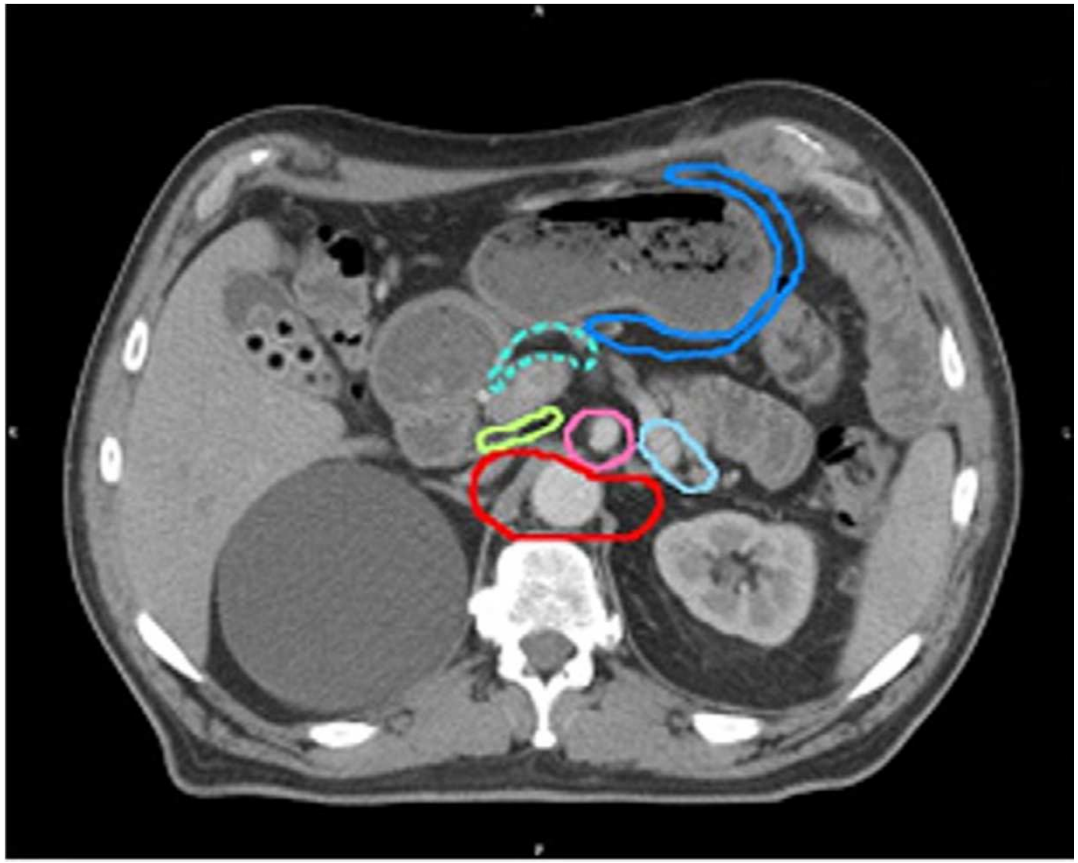
- All other gastric LN stations can be identified as for patients with intact gastric anatomy.
- Rest of the radiogrphic slides identify the suprapyloric, infrapyloric,hepatoduodenal, celiac, common hepatic, pancreatic,superior mesenteric, and paraortic LNs.

Esophagogastrectomy



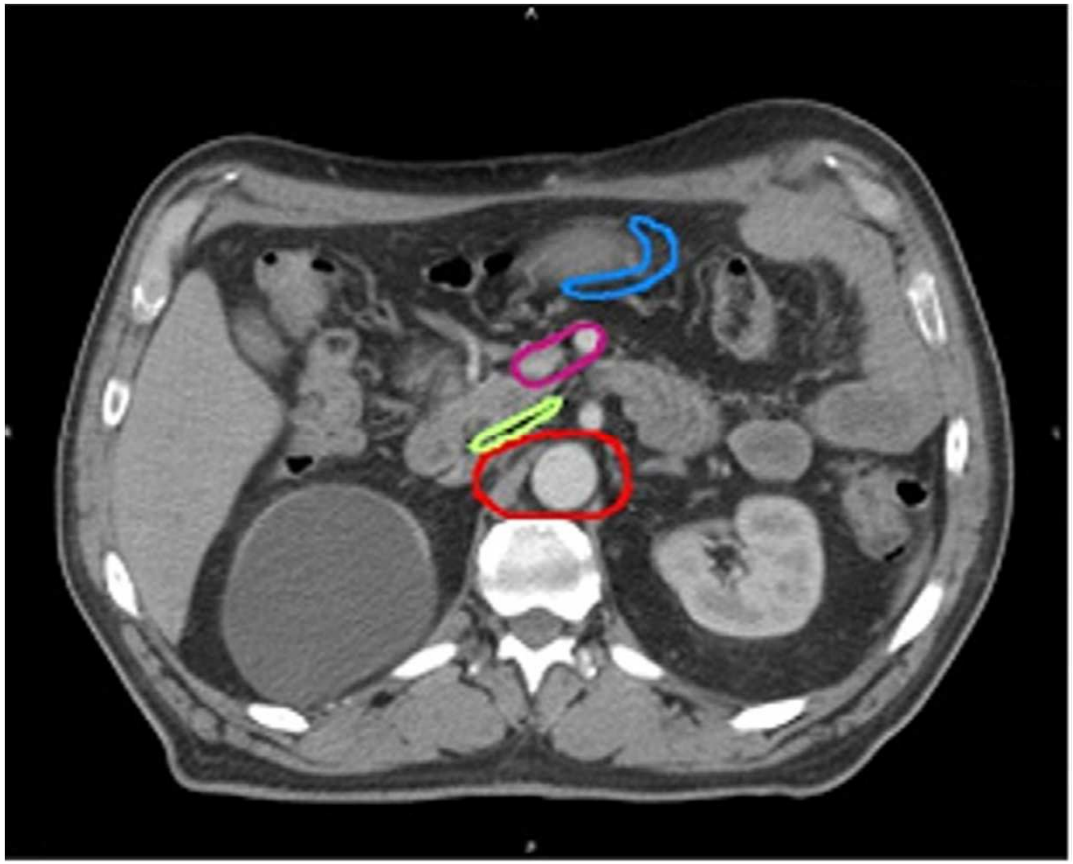
greater curvature (blue), lesser curvature,splenic,,hepatoduodenal(green), suprapyloric (yellow),coeliac (pink), commom hepatic (purple), left gastric (dashed), paraaortic (red)

Esophagogastrectomy



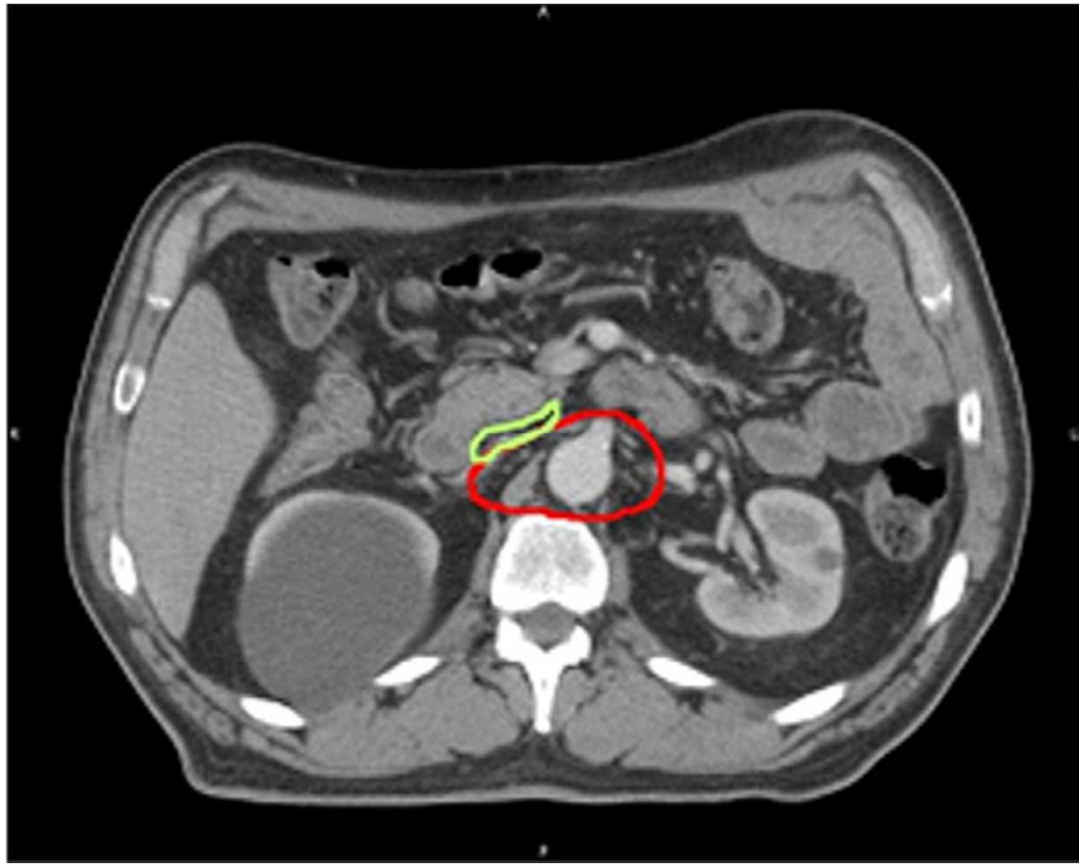
greater curvature (blue), pancreatic (light green),splenic, coeliac (pink), infrapyloric(dashed), paraaortic (red)

Esophagogastrectomy



greater curvature (blue), pancreatic (light green),superior mesenteric (violet), paraaortic (red)

Esophagogastrectomy

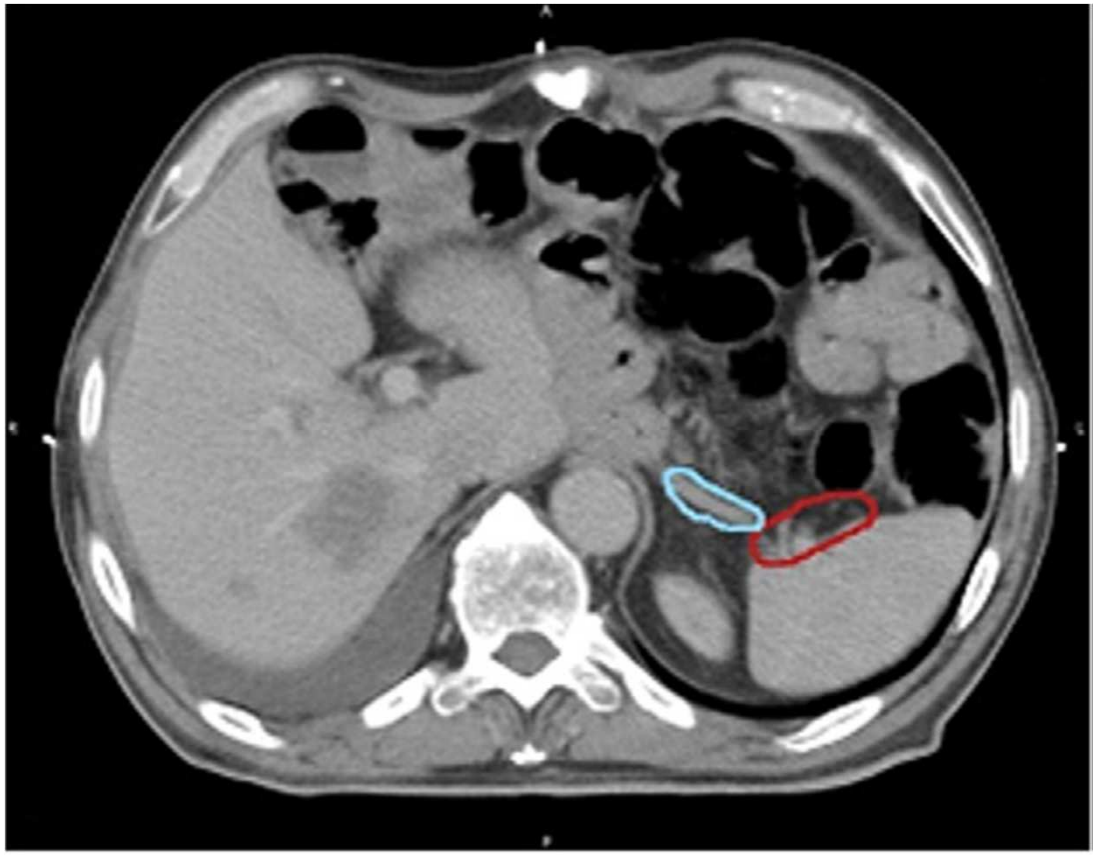


pancreatic (light green), paraaortic (red)

Total gastrectomy

- During a total gastrectomy, the right and left gastric arteries are divided at their respective bases, and the entire stomach is removed from the gastroesophageal junction to the duodenum just below the pylorus.
- Thus, the right and left paracardial and lesser and greater curvature LNs should ideally be completely dissected without residual nodal tissue

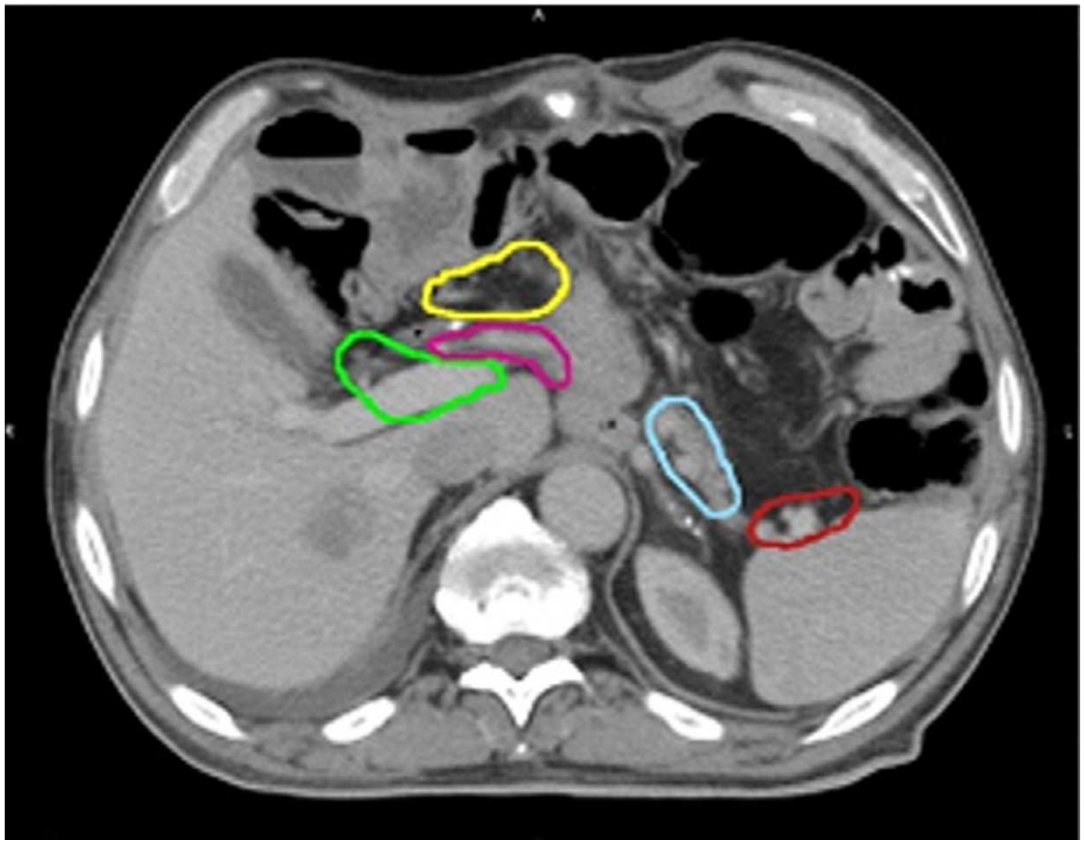
Total gastrectomy



Splenic hilum(brown), splenic(blue)

- In contrast, the suprapyloric, infrapyloric, and
- left gastric LNs are variably dissected and therefore may be identifiable in postoperative imaging.

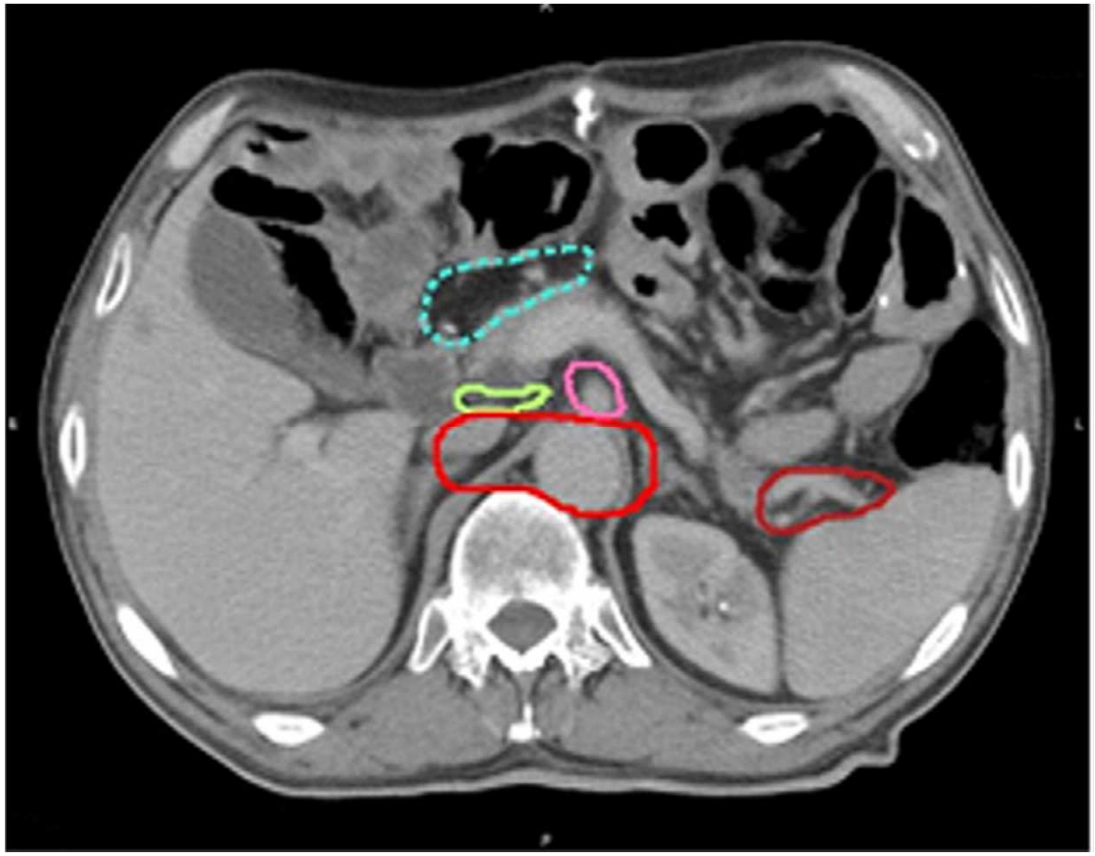
Total gastrectomy



Splenic hilum(brown), splenic(blue),hepatoduodenal(green), commom hepatic(violet), suprapyloric(yellow)

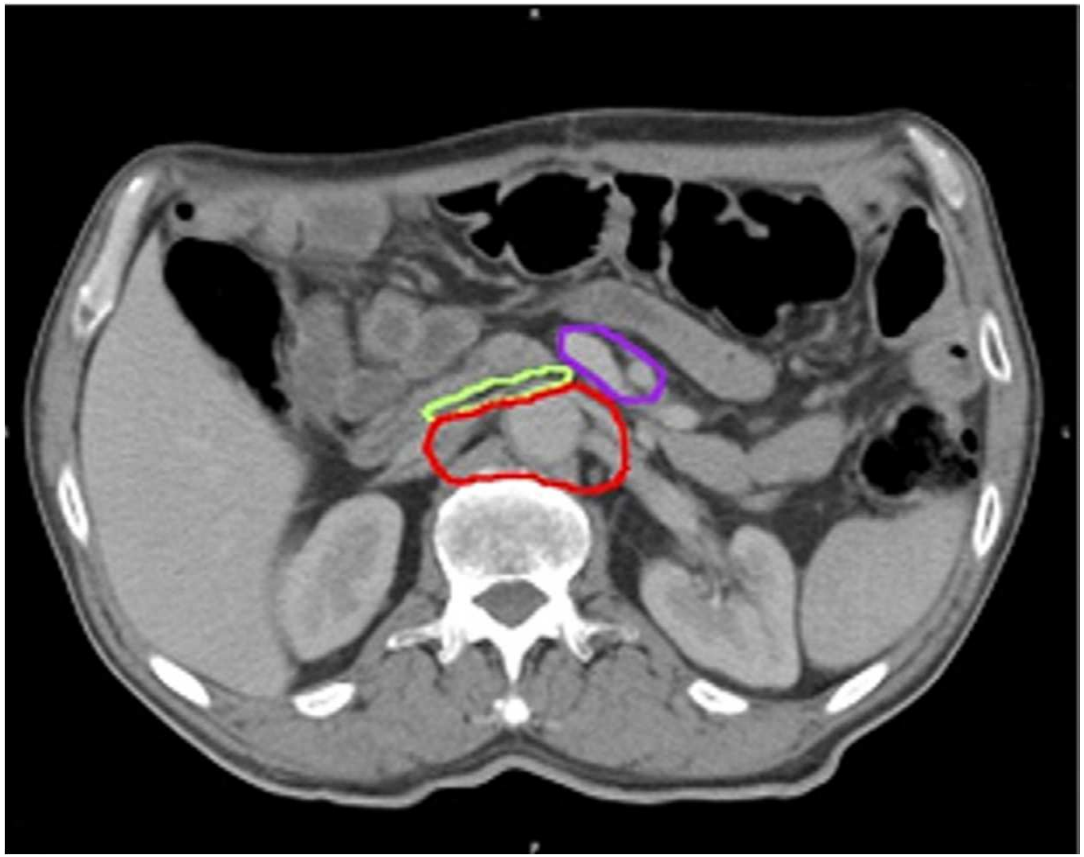
- Similar to a patient with intact gastric anatomy,identification of the splenic, splenic hilum, celiac, hepatoduodenal, common hepatic, pancreatic, superior mesenteric, and paraortic LN stations remains the same.

Total gastrectomy



Splenic hilum(brown), paraaortic(red),pancreatic(green), coeliac(pink), infrapyloric(dashed)

Total gastrectomy



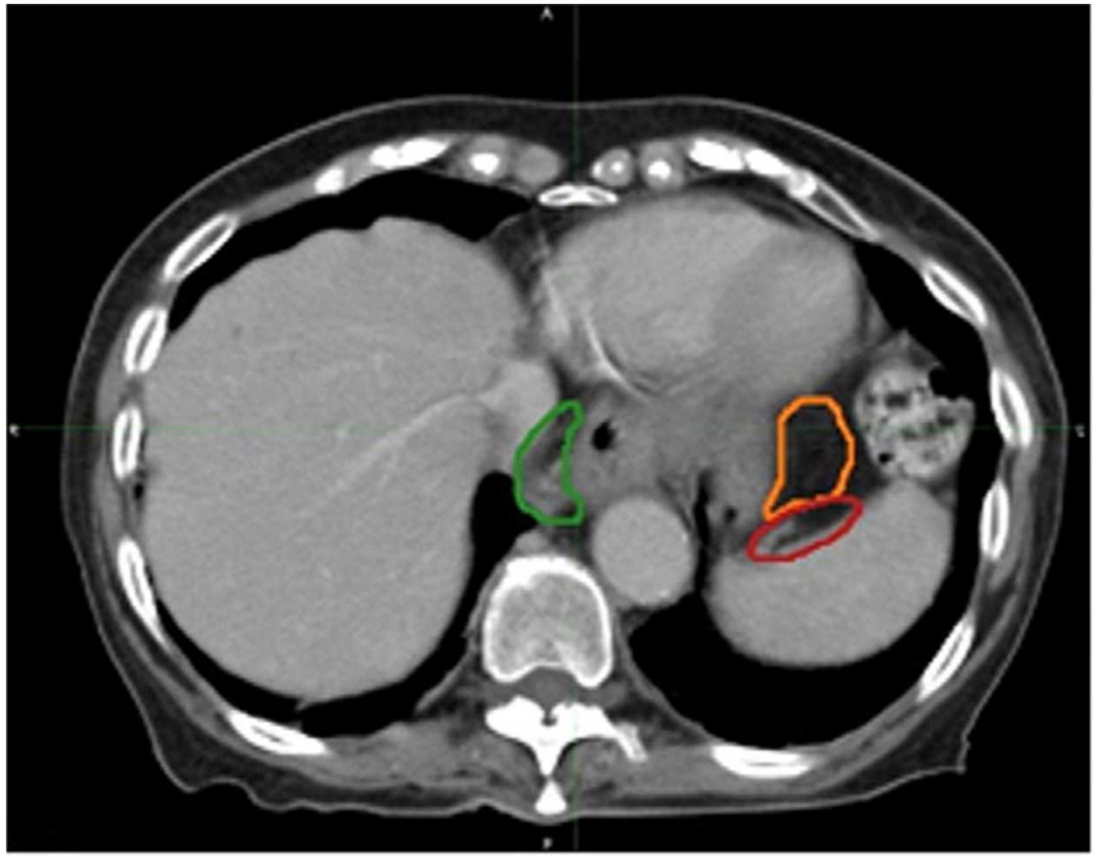
paraaortic(red),pancreatic(green), superior mesentric(violet),

Subtotal gastrectomy

Subtotal gastrectomy

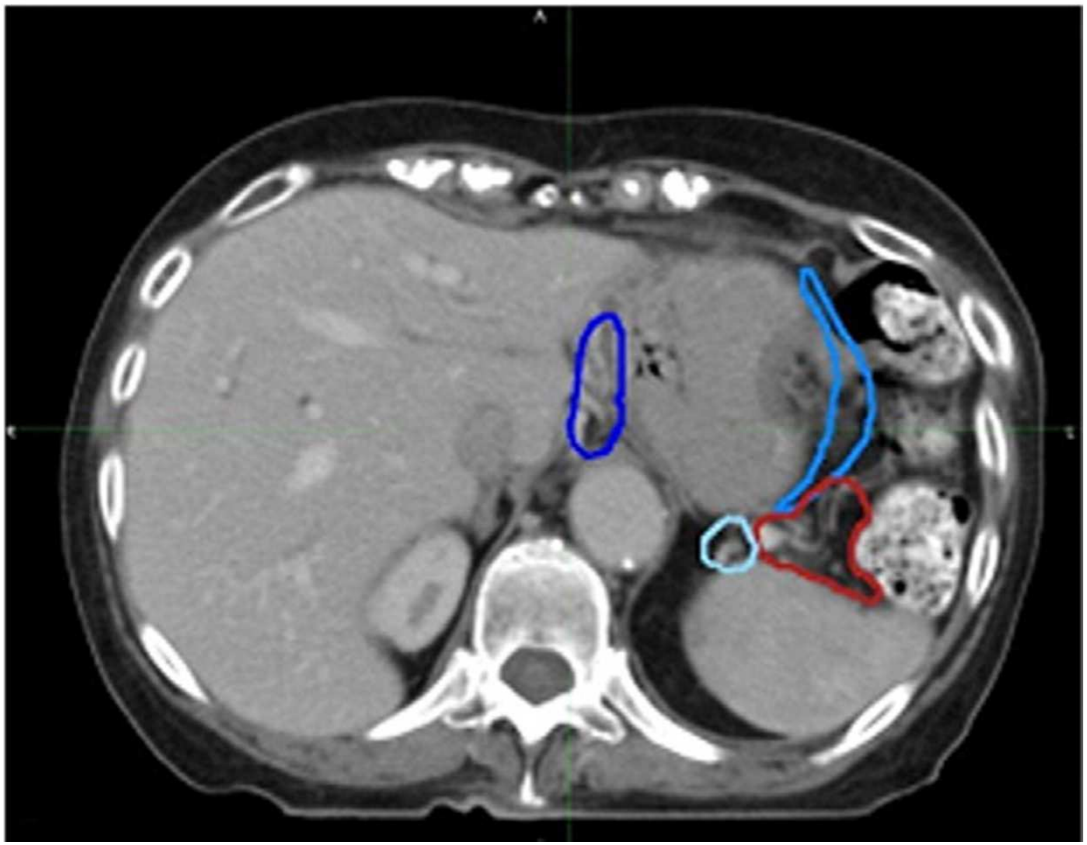
- During a subtotal gastrectomy the left gastric artery is often dissected at its base - surgical clips demarcating the left gastric artery need to be contoured.
- Because the proximal stomach is left intact in a subtotal gastrectomy, the right paracardial and left paracardial nodes and portions of the lesser curvature and greater curvature LNs are not surgically dissected – readily identifiable on postoperative imaging.
- The infrapyloric and suprapyloric tissue are ideally removed during a subtotal gastrectomy, precluding any definitive identification of these LN stations after a subtotal gastrectomy.

Subtotal gastrectomy



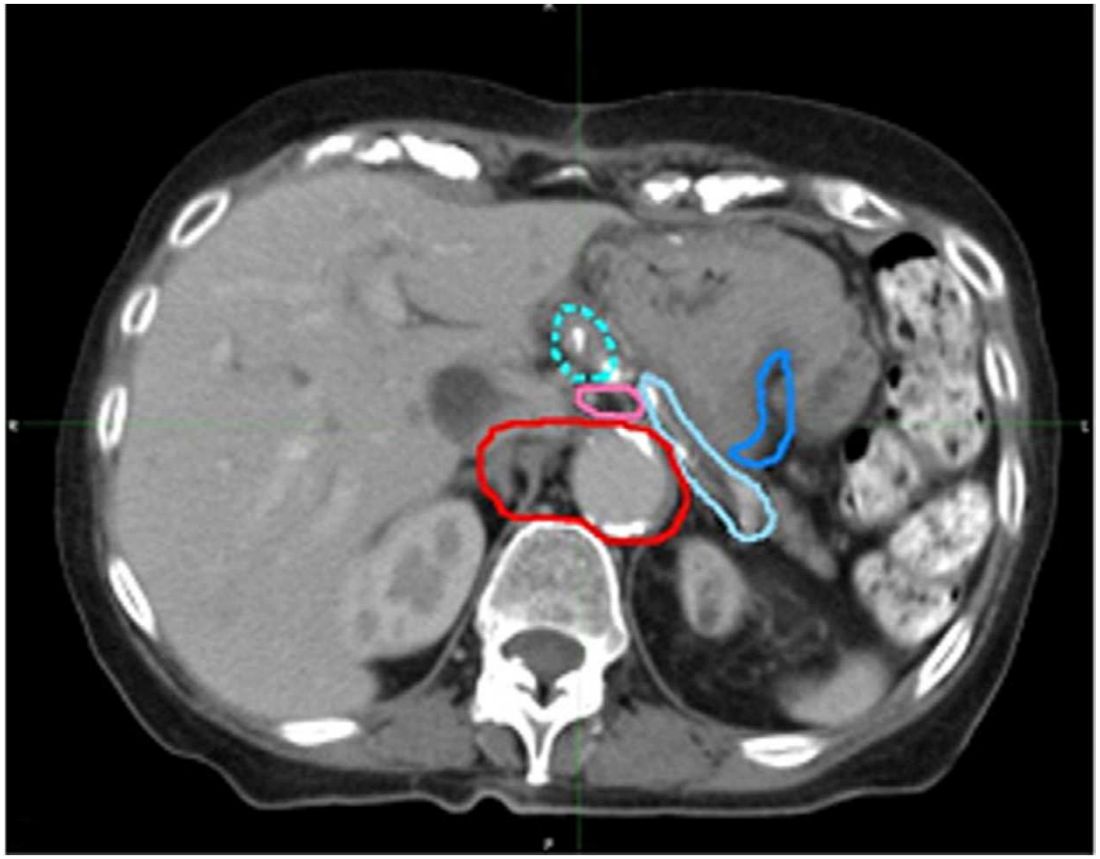
Right paracardial(green), left paracardial(orange), splenic hilum(brown),

Subtotal gastrectomy



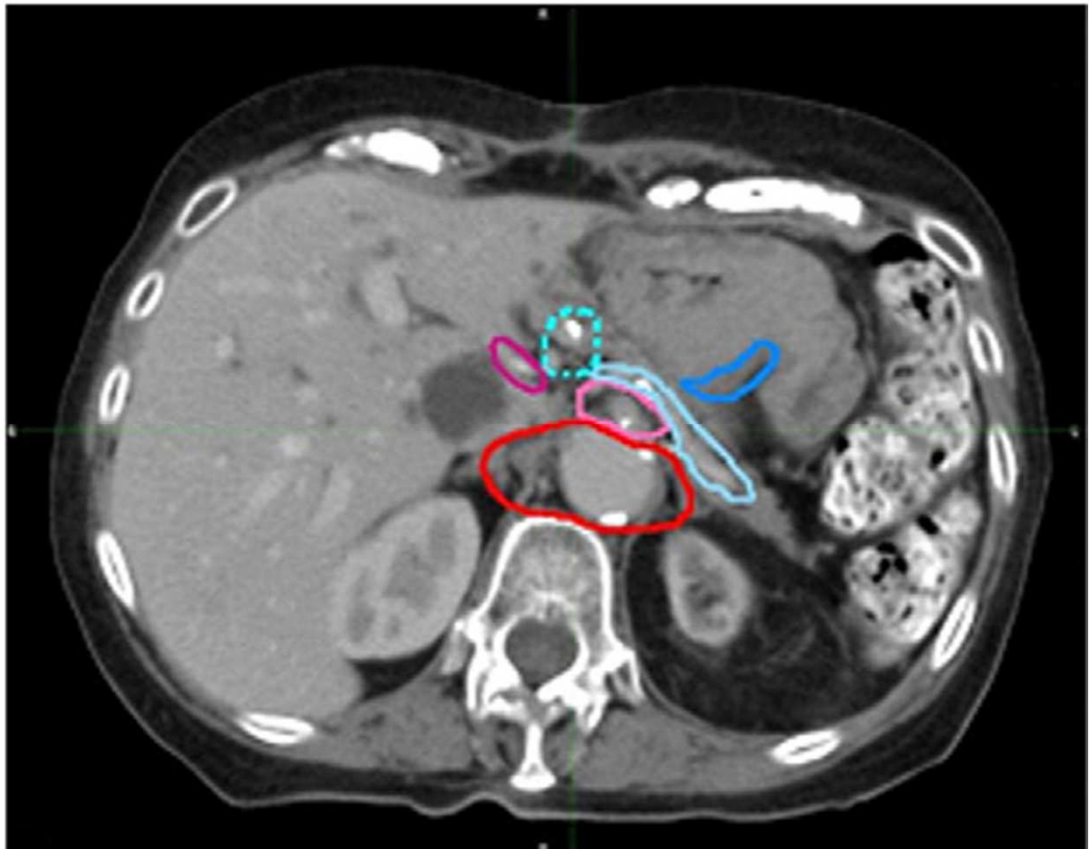
Greater curvature(blue), lesser curvature(dark blue), splenic(sky blue), splenic hilum(brown)

Subtotal gastrectomy



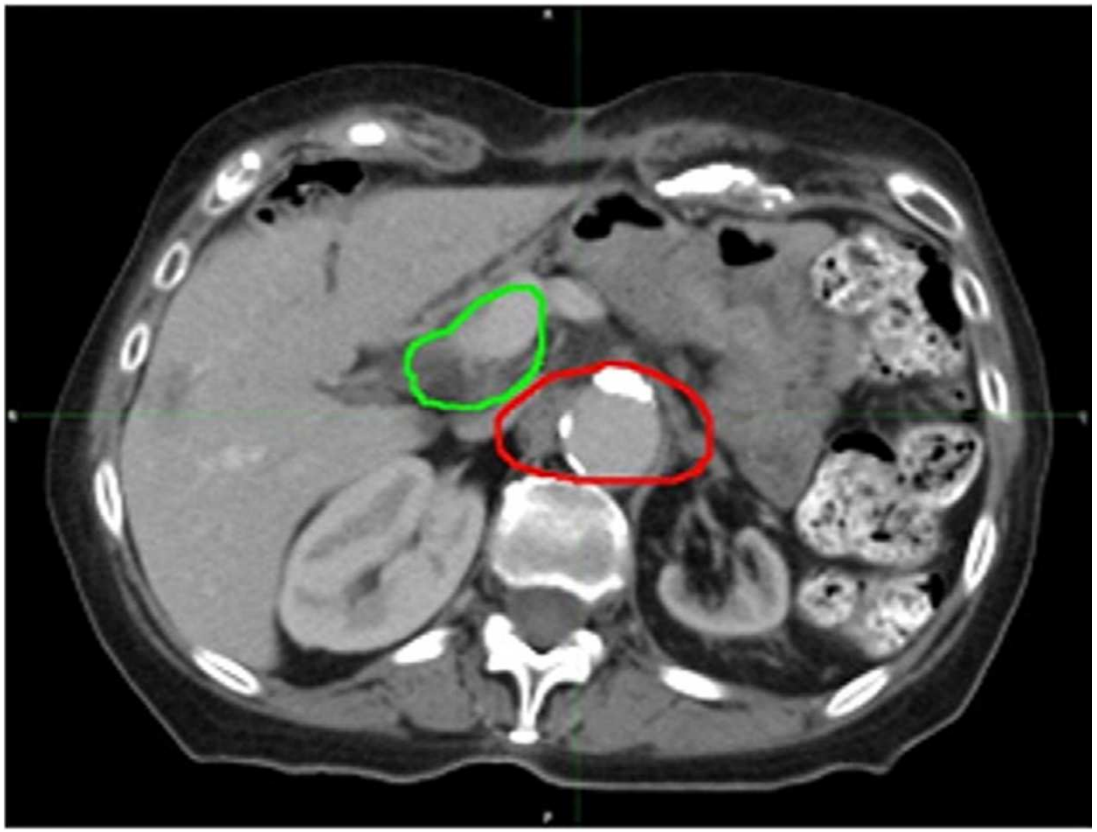
Greater curvature(blue), coeliac(pink), splenic(sky blue), left gastric(dashed),paraaortic(red)

Subtotal gastrectomy



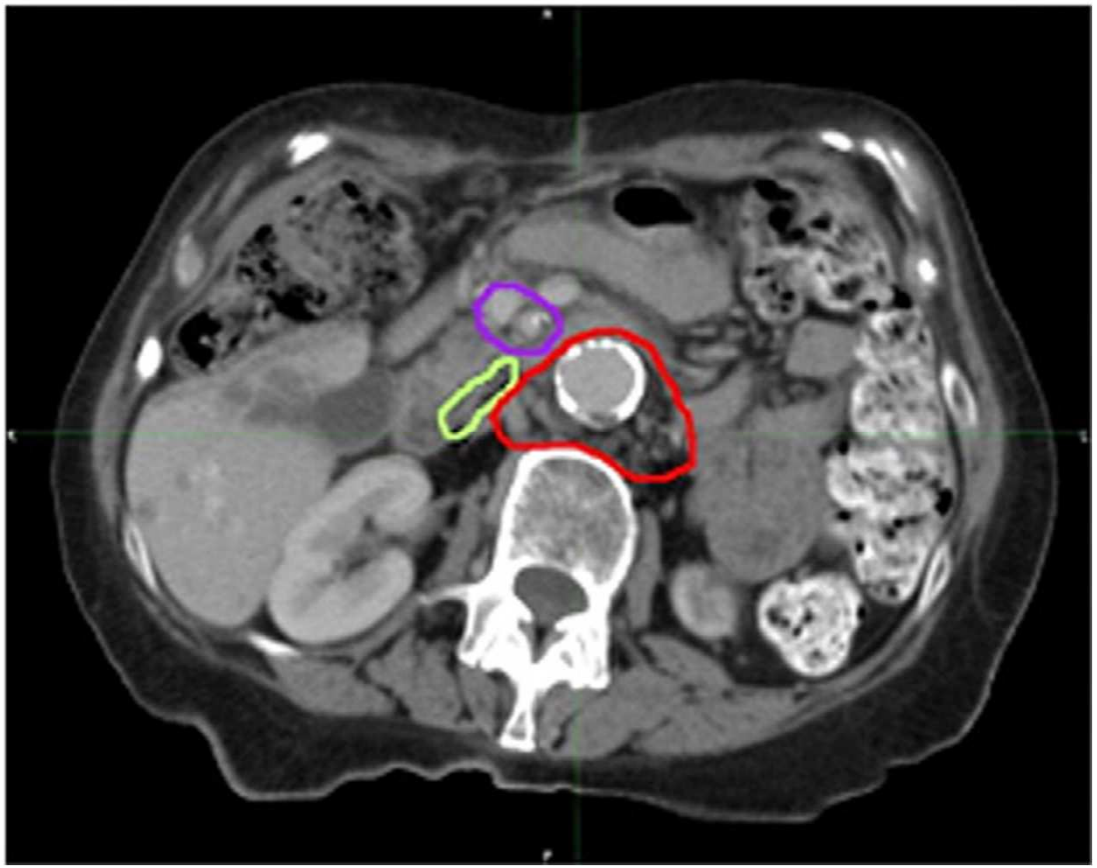
Greater curvature(blue), coeliac(pink), splenic(sky blue), left gastric(dashed),paraaortic(red),common hepatic(violet)

Subtotal gastrectomy



Hepatoduodenal(green), paraaortic(red)

Subtotal gastrectomy



Hepatoduodenal(green), paraaortic(red),
superior mesenteric(violet)

- Technique recommendation should be interpreted with caution and should serve as a guide rather than a cooking recipe