RECENT ADVANCES in SURGERY FOR GASTRIC CANCER

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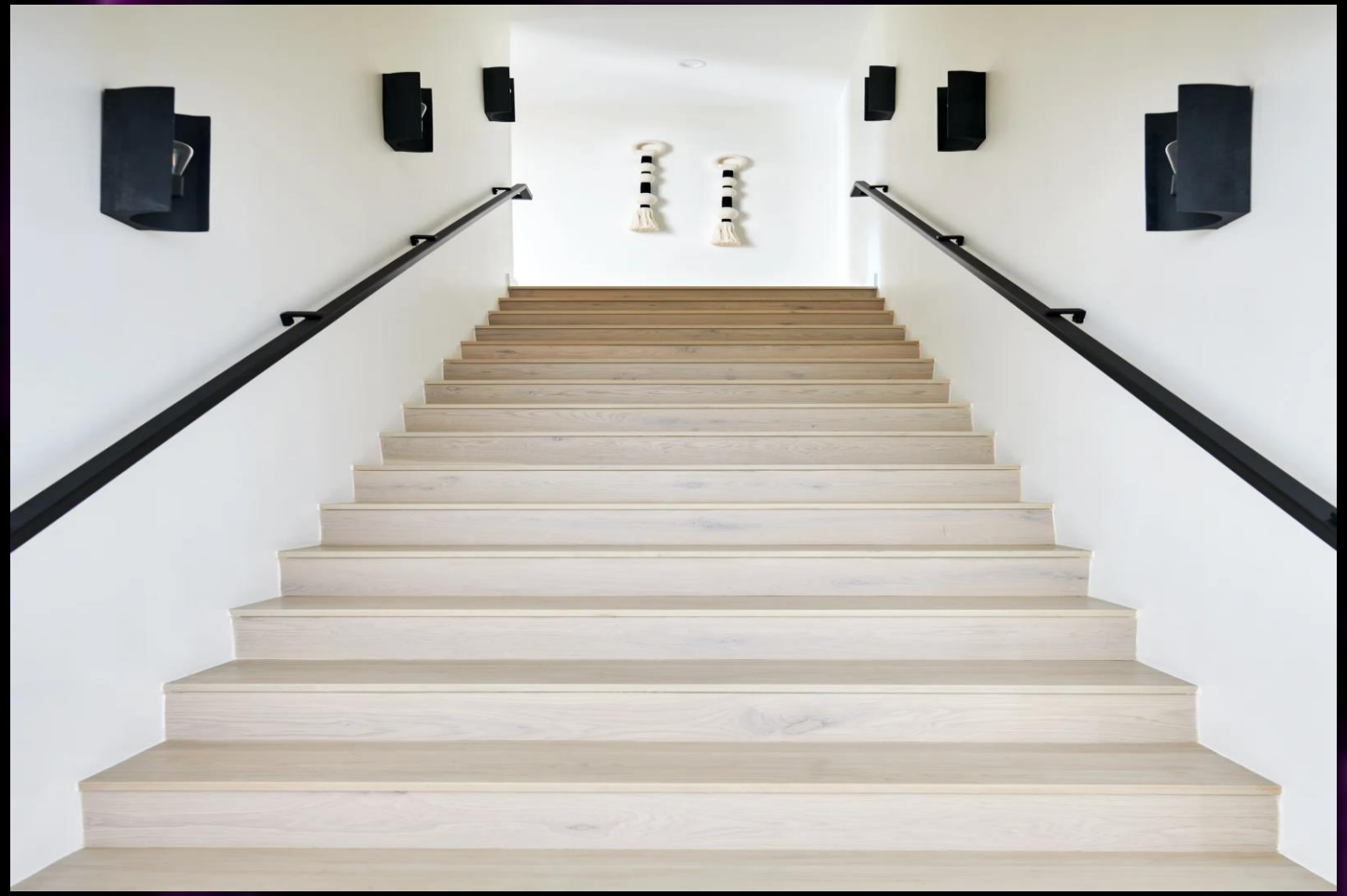
- Woodlands Multispecialty Hospital

THE STAIRCASE



HISTORY TAKING

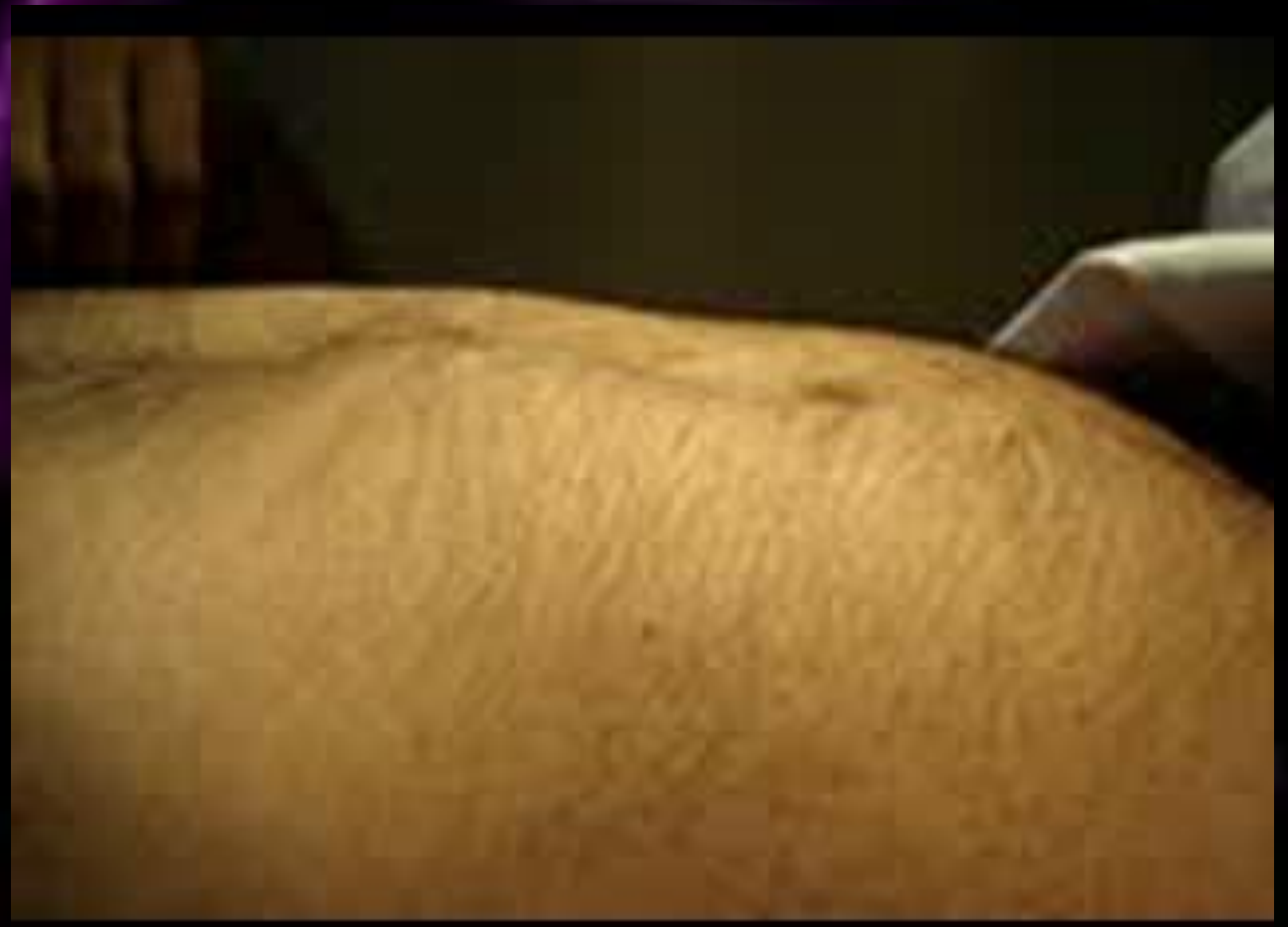
PLEASE IDENTIFY YOUR PATIENT

- Name
- Age
- Sex
- Address
- Profession

PRESENTATION

- Indigestion
- Nausea or vomiting
- Dysphagia
- Postprandial fullness
- Loss of appetite
- Melaena or pallor from anaemia
- Hematemesis
- Weight loss
- Palpable enlarged stomach with succussion splash
- Enlarged lymph nodes

What is being shown on the video?



WHAT IS BEING SHOWN?

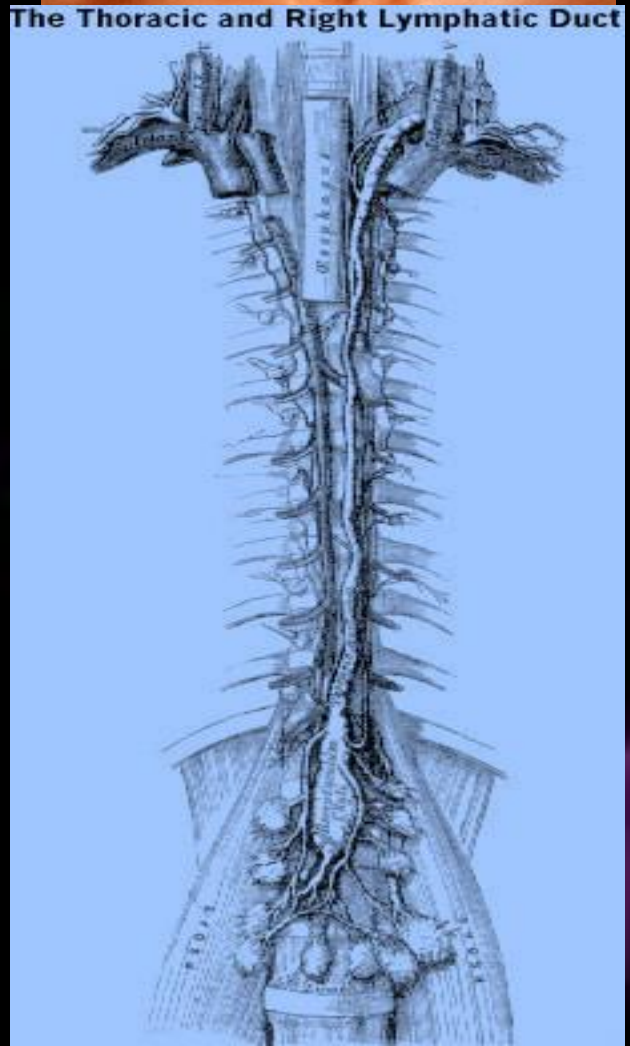
1. Peristalsis from left to right. ✓
2. Peristalsis from right to left.
3. Pulsatile mass in the upper abdomen.
4. Lump with expansile cough impulse.

How does a Gastric Cancer spread ?

- Local
- Lymphatic
- Vascular
- Transcoelomic

Enlarged lymph node

GENERAL SURVEY



GENERAL SURVEY

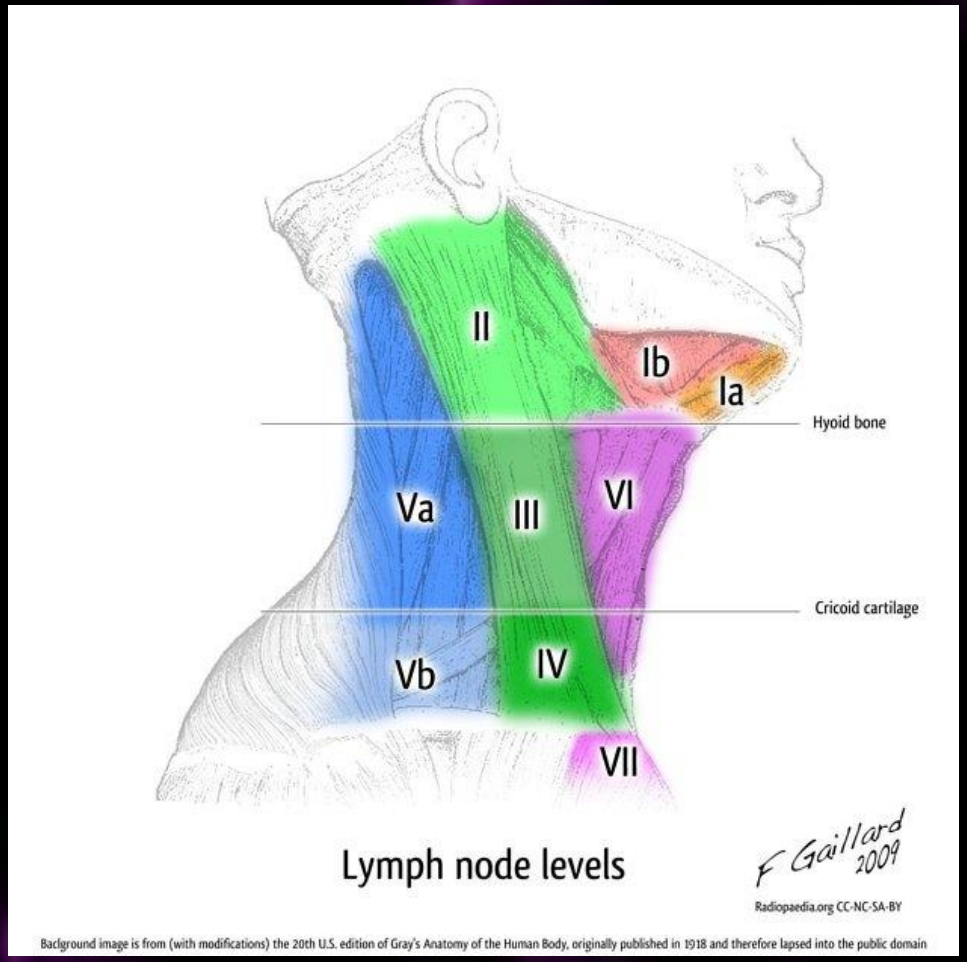
- Examination of the neck.

Rudolf Ludwig Karl Virchow (1821-1902) was a German doctor, anthropologist, pathologist, historian, biologist and politician, known for his advancement of public health.

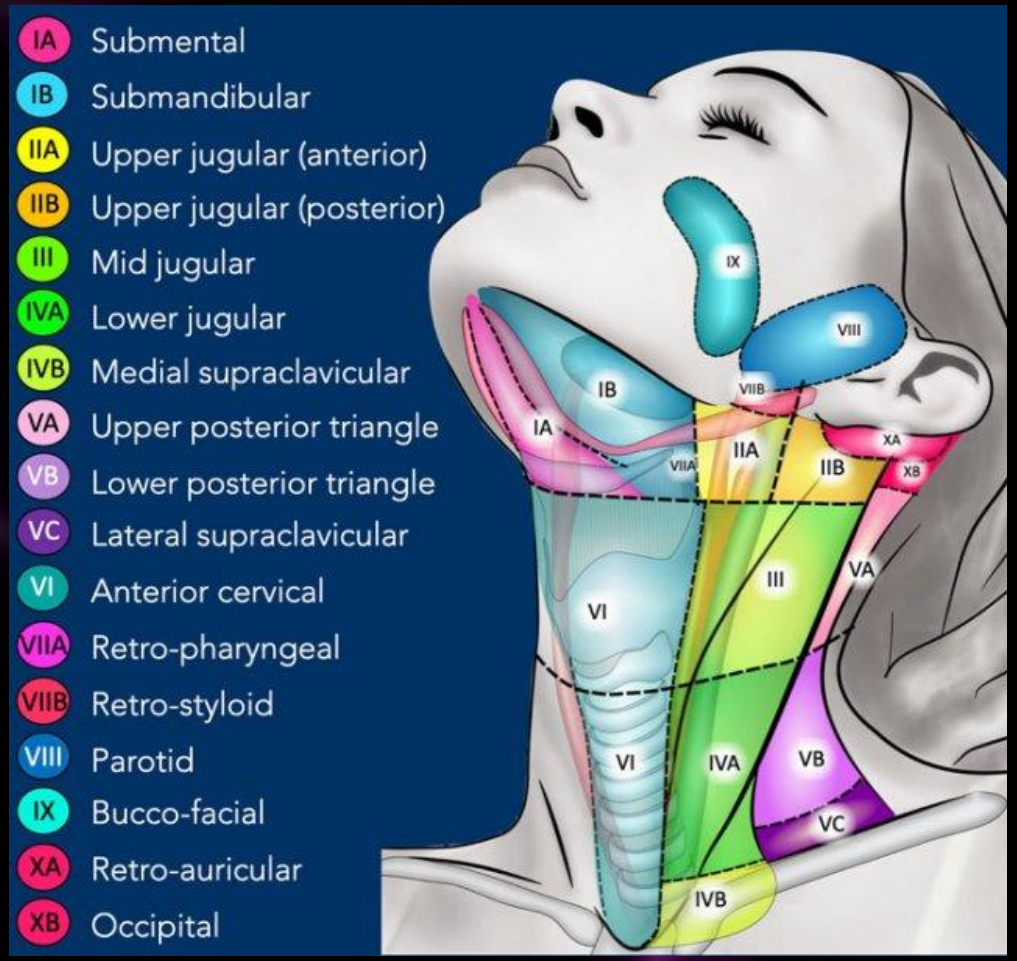
Which Cervical node Station does the Left Supraclavicular Node belong to?

1. Station I
2. Station II
3. Station III
4. ✓ Station IV
5. Station V
6. Station VI

Node Stations of the Neck



https://radiopaedia.org/articles/lymph-node-levels-of-the-neck



https://radiologyassistant.nl/head-neck/cervical-node-mapping/cervical-node-map

How many medical conditions Are named after Virchow?

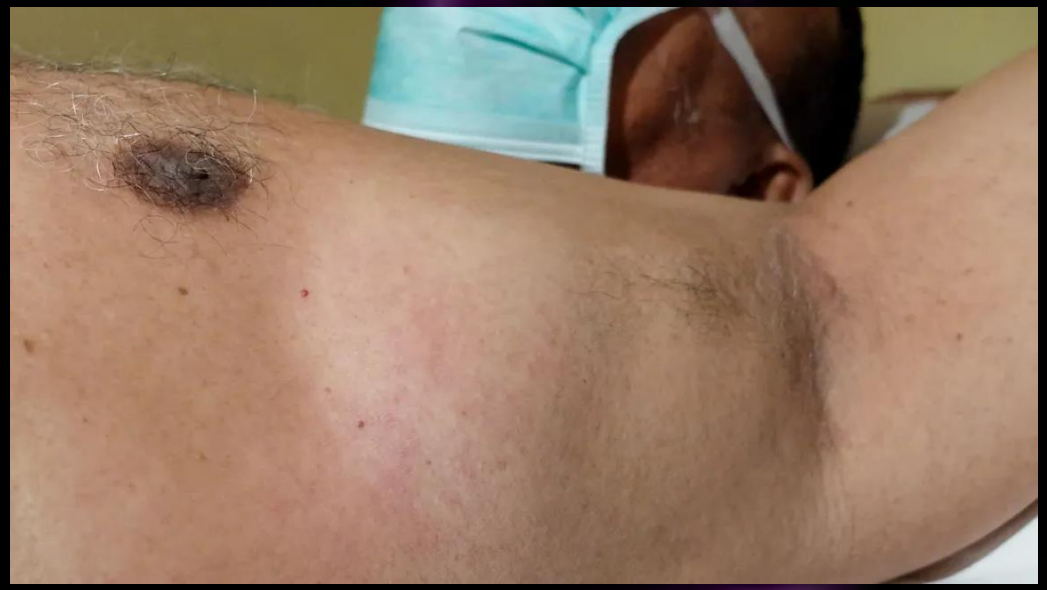
Medical terms named after Virchow

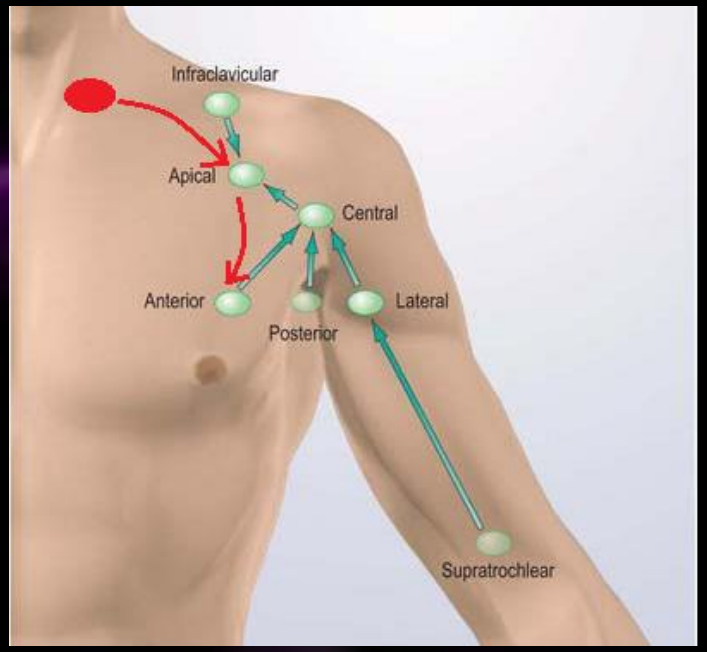
1. Virchow's angle, the angle between the nasobasilar line and the nasosubnasal line.
2. Virchow's cell, a macrophage in Hansen's disease.
3. Virchow's cell theory, "omnis cellula e cellula" - every living cell comes from another living cell.
4. Virchow's concept of pathology, comparison of diseases common to humans and animals.
5. Virchow's disease, leontiasis ossea, now recognized as a symptom rather than a disease.
6. Virchow's gland, Virchow's node the presence of metastatic cancer in a lymph-node in the supraclavicular fossa (root of the neck left of the midline). Also known as Troisier's sign..
7. Virchow's Law, during craniosynostosis, skull growth is restricted to a plane perpendicular to the affected, prematurely fused suture and is enhanced in a plane parallel to it.

Medical terms named after Virchow

8. Virchow's line, a line from the root of the nose to the lambda.
9. Virchow's metamorphosis, lipomatosis in the heart and salivary glands.
10. Virchow's method of autopsy, a method of autopsy where each organ is taken out one by one.
11. Virchow's psammoma, psammoma bodies in meningiomas.
12. Virchow-Robin spaces, enlarged perivascular spaces (EPVS) (often only potential) that surround blood vessels for a short distance as they enter the brain.
13. Virchow-Seckel syndrome, a very rare disease also known as "bird-headed dwarfism".
14. Virchow's triad, the classic factors which precipitate venous thrombus formation: trauma, stasis and hypercoaguability.

What is this presentation in a patient of Gastric cancer?





IRISH NODE

PRESENTATION

FEATURES OF DISSEMINATION

- Enlarged lymph nodes
- Back pain
- Lower abdominal lump (?patient profile)
- Free fluid in the abdomen
- Palpable liver
- Obstructive jaundice
- Pleural effusion
- Neurological symptoms
- Bone pain

PRESENTATION

PARANEOPLASTIC SYNDROMES

- Diffuse seborrheic keratoses (sign of Leser-Trélat)
- Acanthosis nigricans
- Microangiopathic hemolytic anemia
- Membranous nephropathy
- Polyarteritis nodosa
- Migrating thrombophlebitis (?eponymous name)

PRE-OPERATIVE WORK-UP

- Clinics.
- Upper GI Endoscopy and Geographical Biopsy.
- Imaging
  - US Scan
  - CT Scan of Chest, Abdomen and Pelvis.
  - PET-CT SCAN where equivocal features of dissemination exists.
- EUS particularly if
  - ✓Early stage cancer amenable to EMR
  - ✓Patients being considered for Neoadjuvant therapy.

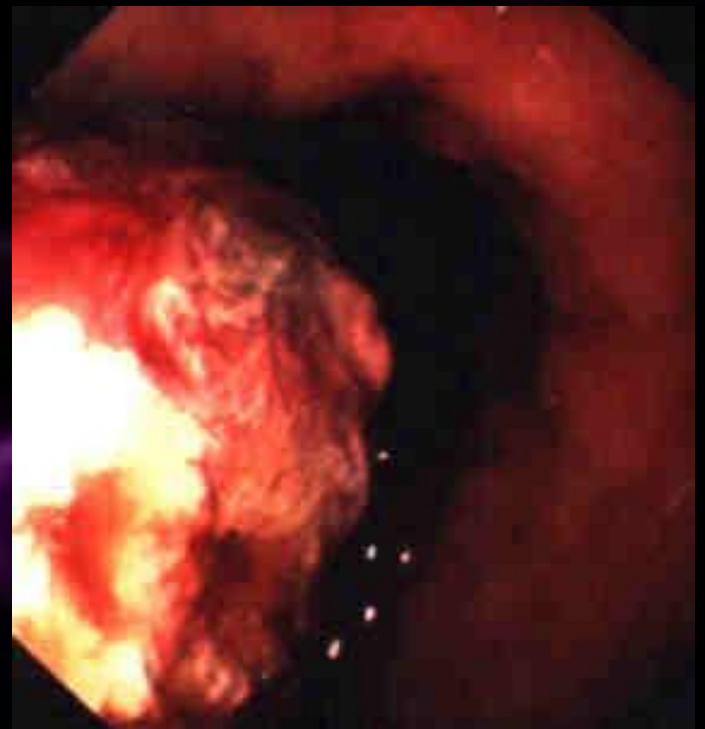
Histological Classification of Gastric Cancer {Lauren}

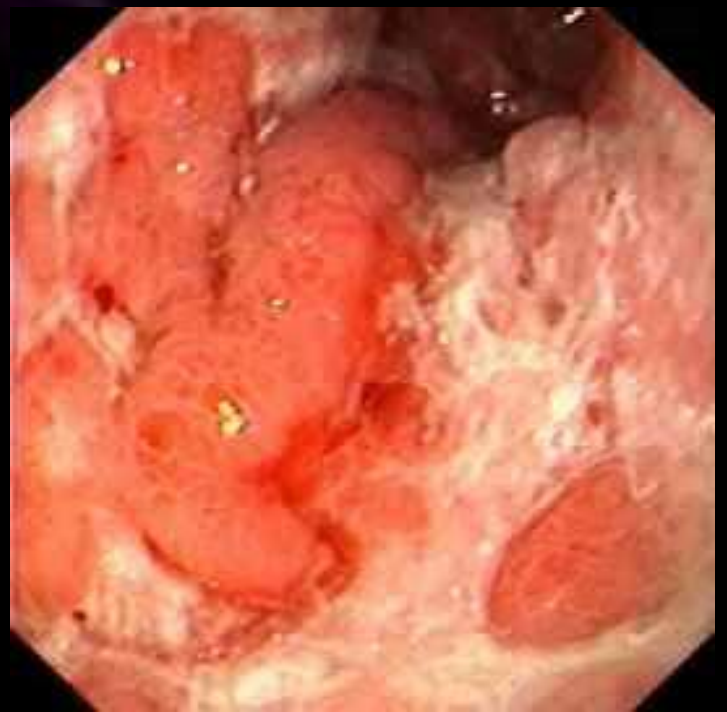
GASTRIC CARCINOMA

INTESTINAL

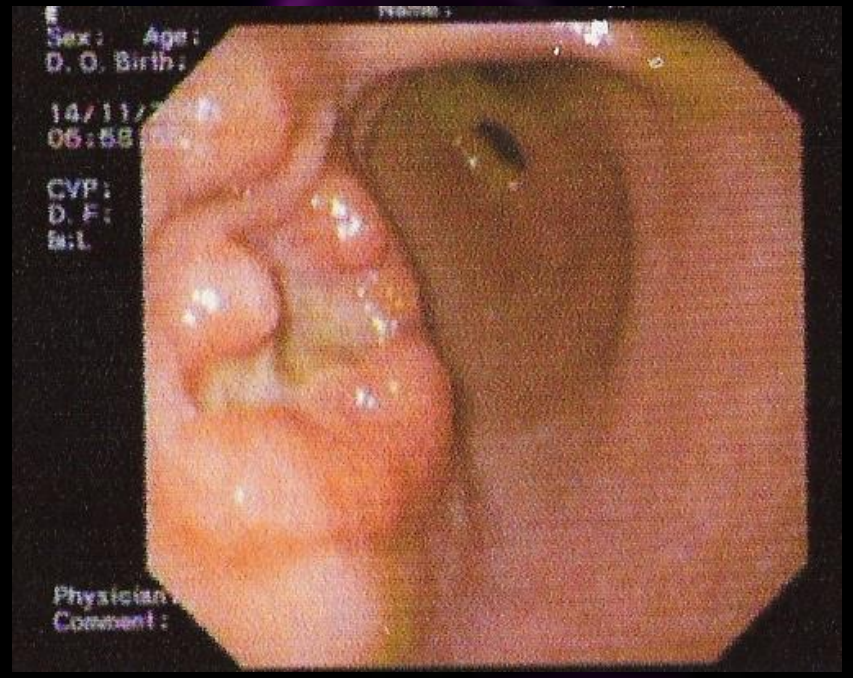
DIFFUSE

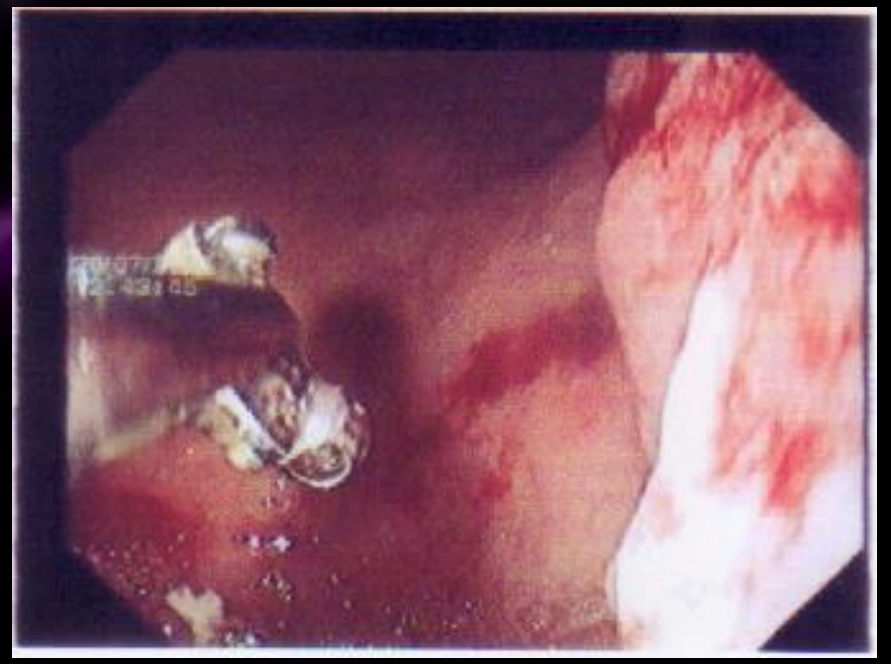
TYPES OF H pylori induced INTESTINAL METAPLASIA DEPENDING ON THE TYPE OF MUCIN SECRETED
TYPE I:- Only sialomucins gastric mucins absent
TYPE II:- mixture of gastric mucins and intestinal sialomucins
TYPE III:- columnar mucous cells containing sulfomucins





UGI ENDOSCOPY





HOW MANY BIOPSY SAMPLES?

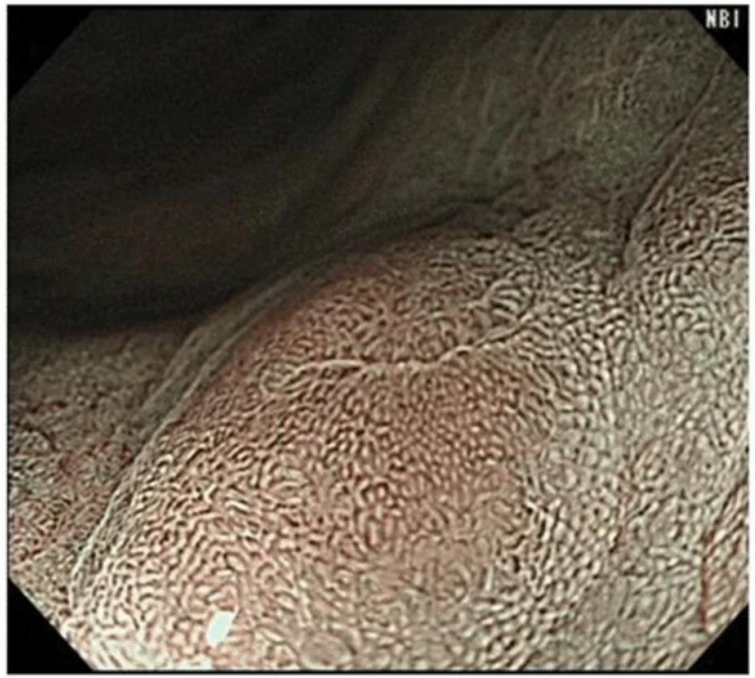
1. Four
2. Five
3. ✓ Seven
4. Twelve

HOW MANY BIOPSY

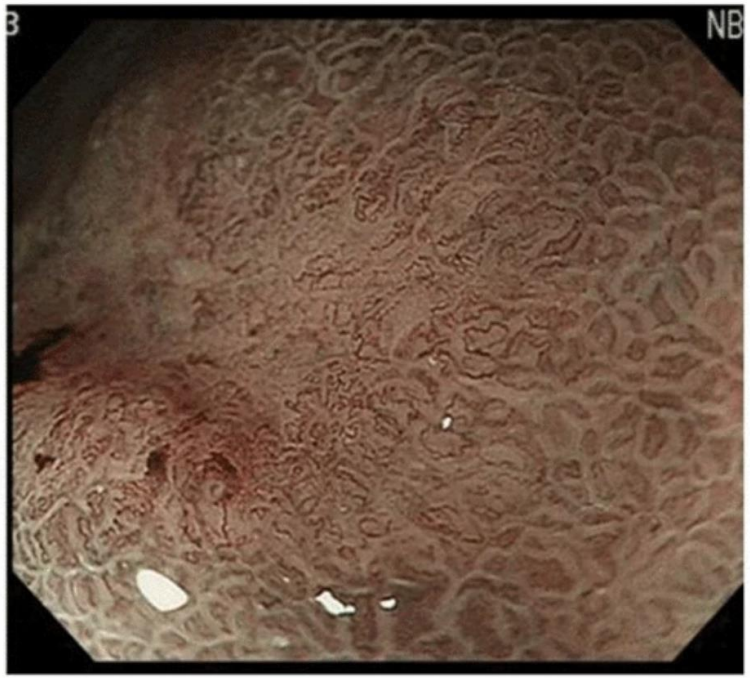
- A single biopsy has a 70 percent sensitivity for diagnosing an existing gastric cancer,
- However, performing seven biopsies from the ulcer margin and base increases the sensitivity to greater than 98 percent.
- Linitis plastica can have a false negative biopsy.

- *Prospective evaluation of biopsy number in the diagnosis of esophageal and gastric carcinoma. Graham DY, Schwartz JT, Cain GD, Gyorkey F Gastroenterology. 1982;82(2):228.*
- *Stomach cancer endoscopy and biopsy; ed C. Michael Gibson, M.S., M.D. https://www.wikidoc.org/index.php/Stomach_cancer_endoscopy_and_biopsy*

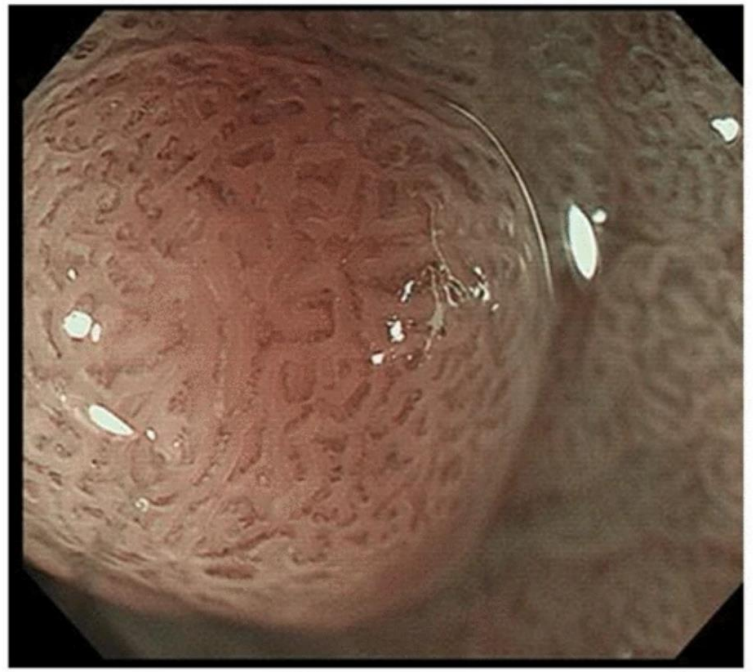
MAGNIFYING NARROW-BAND IMAGING



Is a representative case of gastric adenoma with 100% accuracy in M-NBI correctly diagnosed by all endoscopists.



Is a representative case of gastric cancer correctly diagnosed by all endoscopists.



Is a representative case of gastric cancer correctly diagnosed by only 21% of endoscopists.

Tamura, N., Sakaguchi, Y., Furutani, W. et al. Magnifying endoscopy with narrow-band imaging is useful in differentiating gastric cancer from matched adenoma in white light imaging. Sci Rep 12, 8349 (2022). https://doi.org/10.1038/s41598-022-12315-0

ANY OTHER TESTING IN BIOPSIES FOR METASTATIC DISEASEE?

- Microsatellite instability (MSI) and deficient mismatch repair (dMMR) testing if metastatic disease is documented/suspected
- HER2-neu and programmed death ligand 1 (PD-L1) testing if metastatic adenocarcinoma is documented or suspected

Role of testing for HER-2

HER2 TESTING WITH IHC

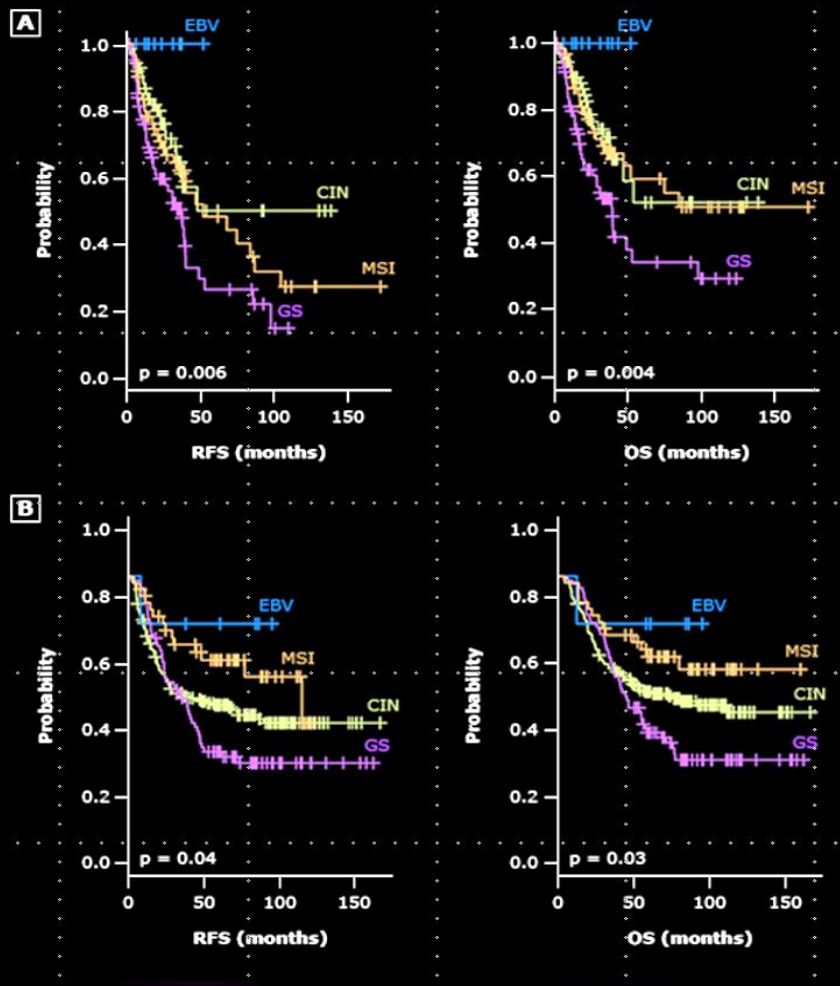
UpToDate®

Surgical Specimen	**Surgical Specimen**	**Surgical Specimen**	**Surgical Specimen**
Basolateral or lateral membranous reactivity in>10% cells	Weak Basolateral or lateral membranous reactivity in>10% cells	Very weak Basolateral or lateral membranous reactivity in>10% cells	No Basolateral or lateral membranous reactivity in<10% cells
Biopsy specimen	Biopsy specimen	Biopsy specimen	Biopsy specimen
Tumour cell clusters similar activity	Tumour cell clusters similar weak activity	Tumour cell clusters similar very weak activity	No activity In any of the cells
IHC 3+	IHC 2+	IHC 1+ or IHC 0	IHC 1+ or IHC 0
No further ISH	Further ISH	No further ISH	No further ISH

Bartley AN, Washington MK, Ventura CB, et al. HER2 Testing and Clinical Decision Making in Gastroesophageal Adenocarcinoma: Guideline From the College of American Pathologists, American Society for Clinical Pathology, and American Society of Clinical Oncology. Arch Pathol Lab Med 2016; 140(12):1345-1363. From Archives of Pathology & Laboratory Medicine. Copyright 2016 College of American Pathologists.

PROGNOSIS

Prognosis of gastric cancer according to molecular subgroups as defined by The Cancer Genome Atlas (TCGA)



EBV – Epstein-Barr Virus

CIN – Chromosomal Instability

MSI – Microsatellite Instability

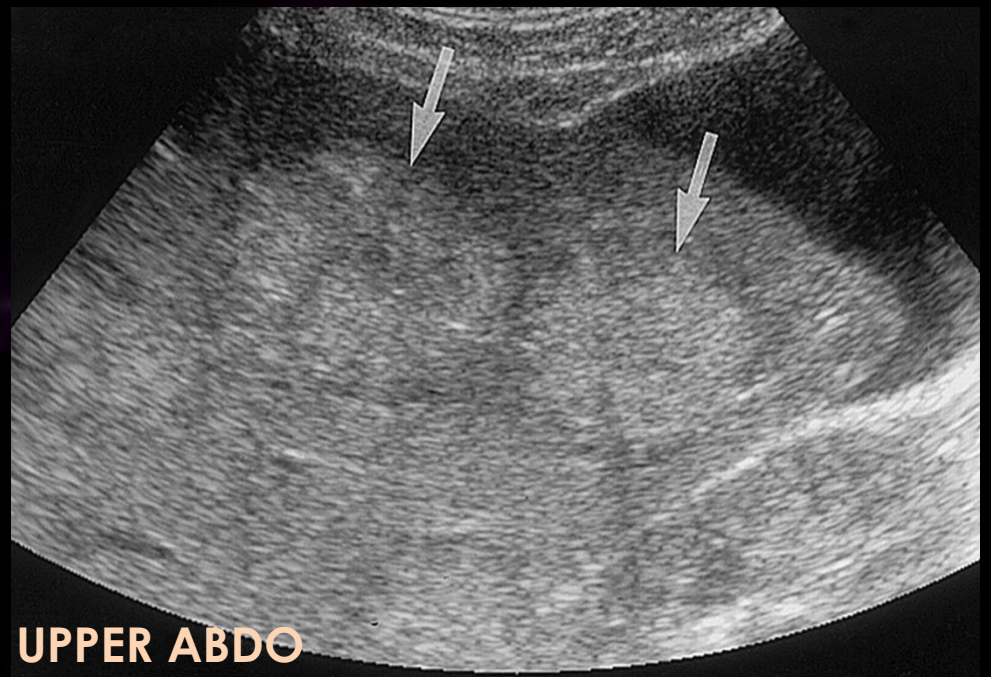
GS – Genomically Stable

Patients in the MDACC cohort (A) and SMC cohort (B) were stratified by subtype; recurrence-free survival (RFS) and overall survival (OS) were plotted for each subtype.

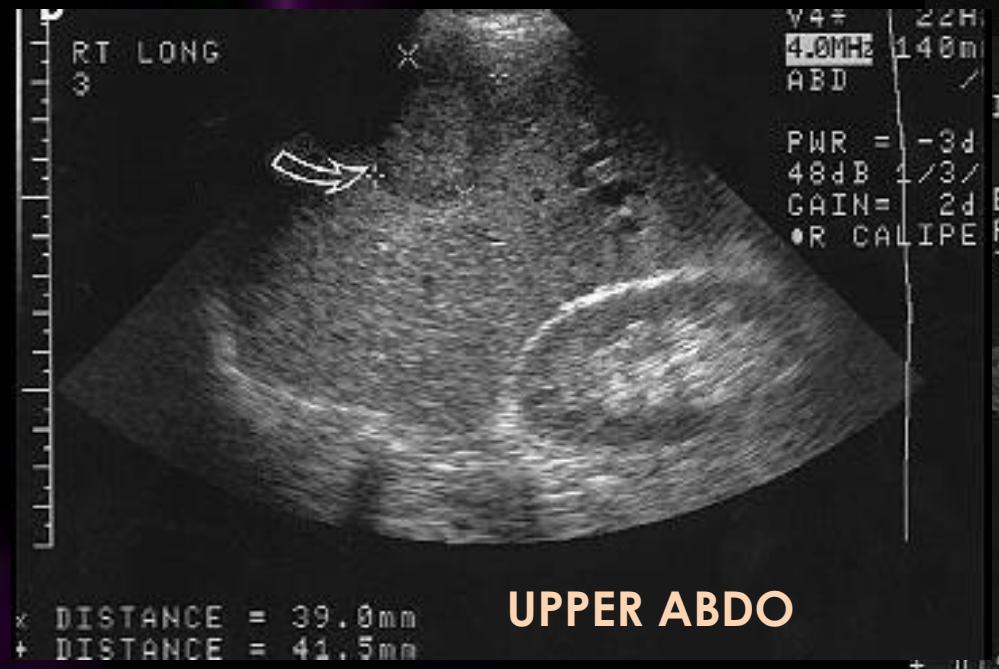
EBV: Epstein-Barr virus; CIN: chromosomal instability; MSI: microsatellite instability; GS: genomically stable; MDACC: MD Anderson Cancer Center; SMC: Samsung Medical Center.

STAGING

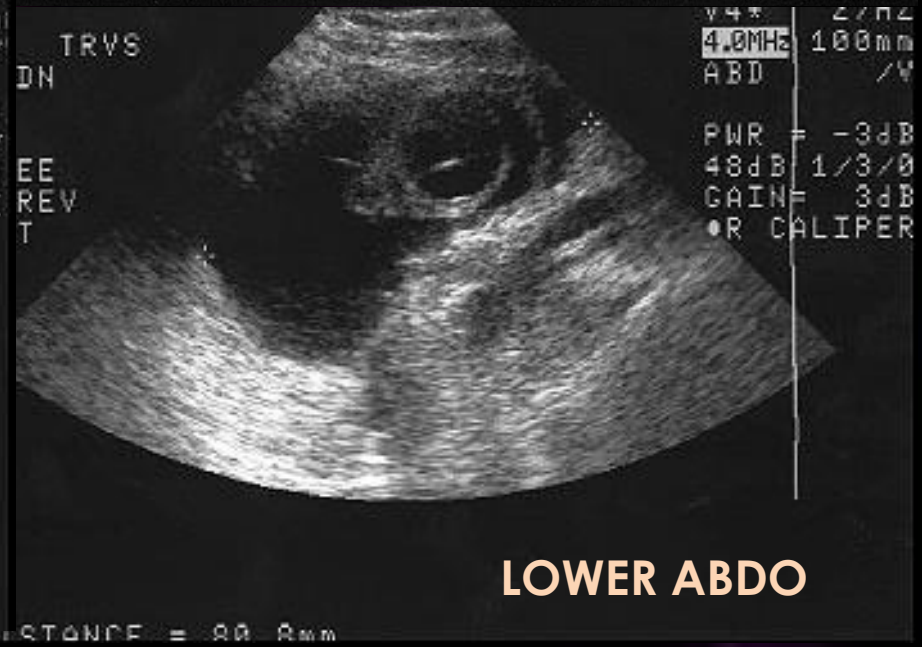
- US scan



UPPER ABDO



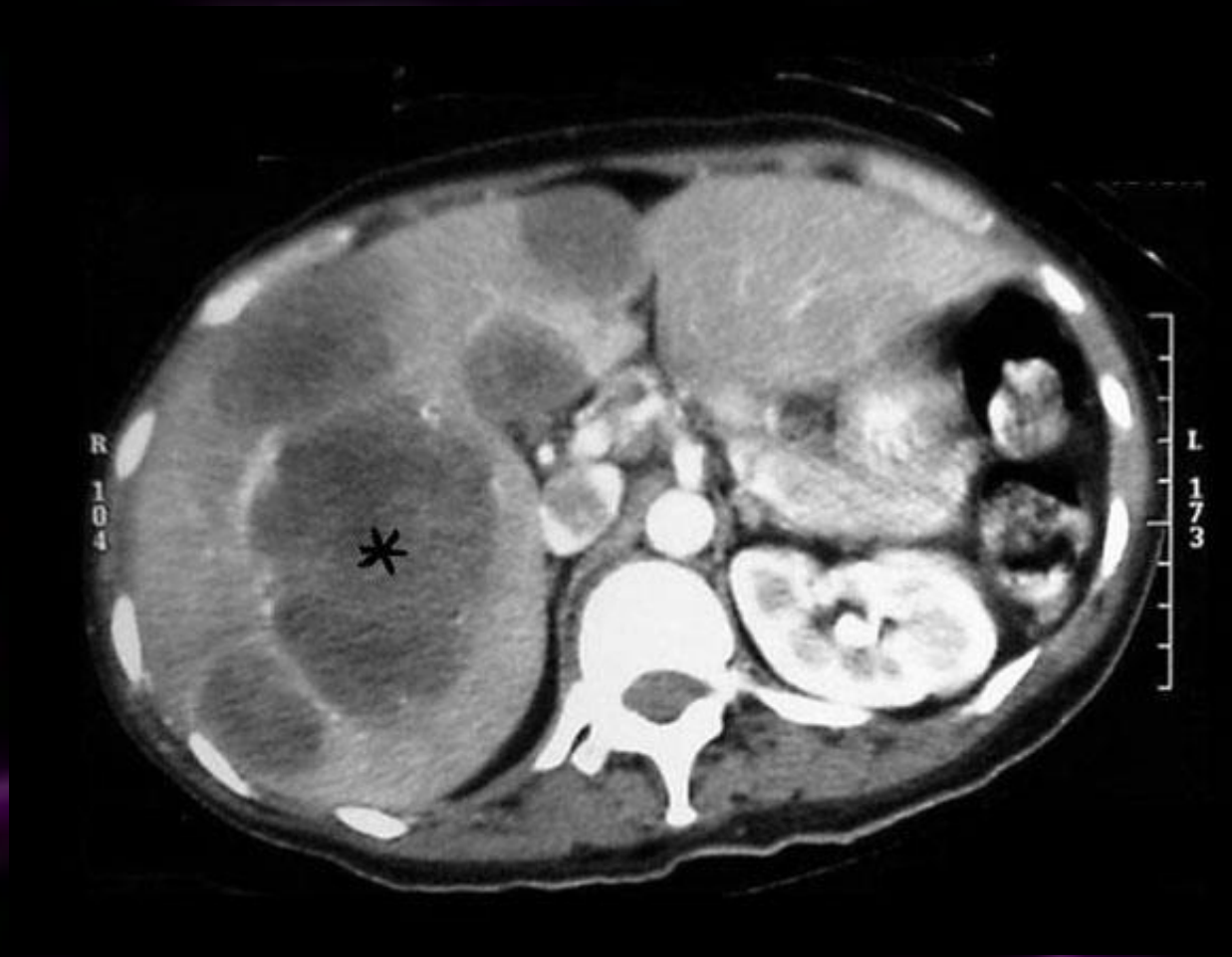
UPPER ABDO



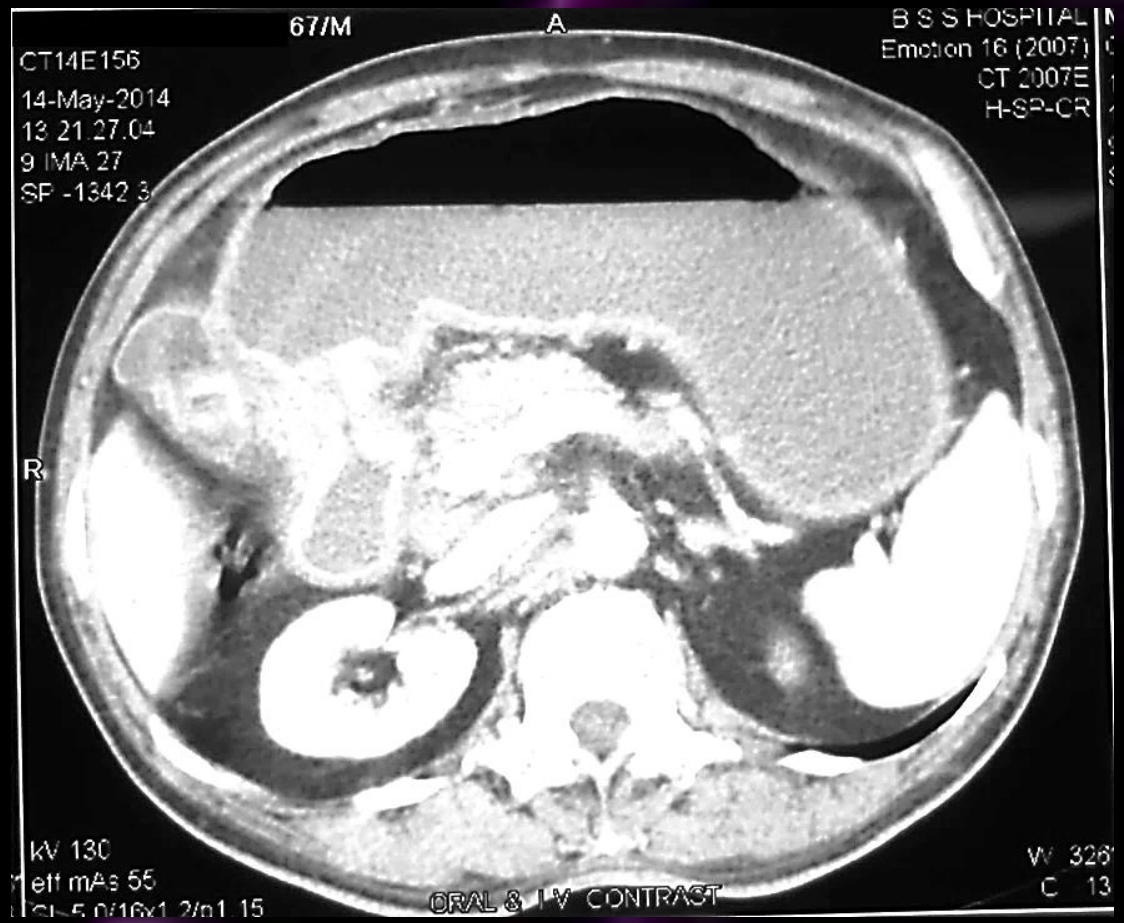
LOWER ABDO

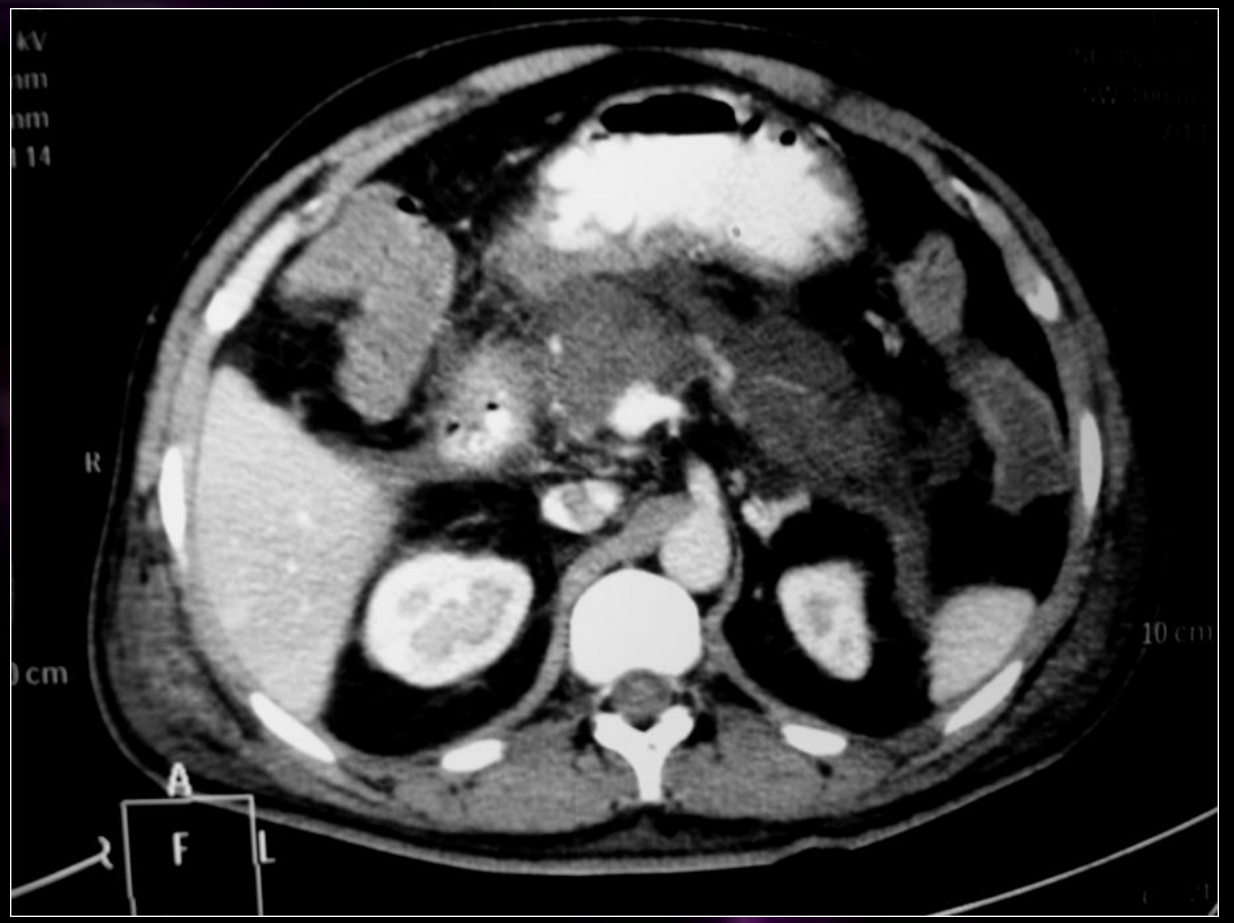
STAGING

- CT Scan



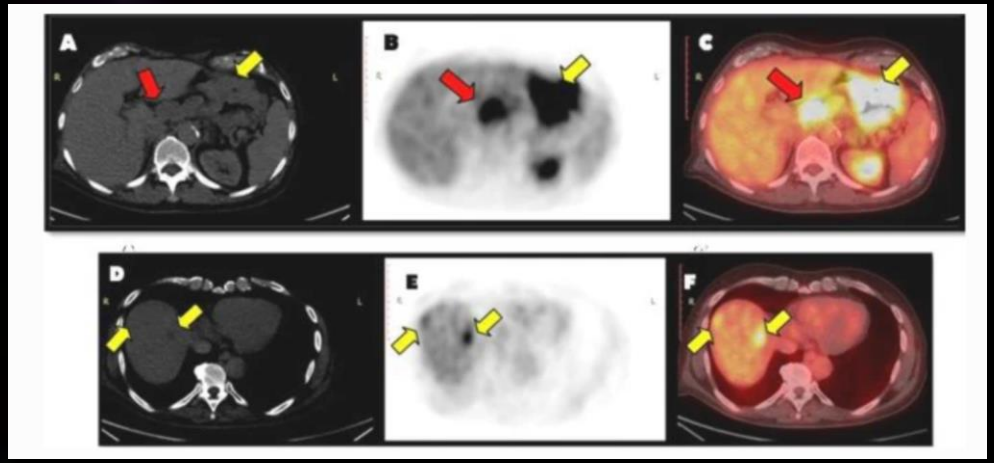
CECT SCAN


67/M
A
B S S HOSPITAL
Emotion 16 (2007)
CT 2007E
H-SP-CR
CT14E156
14-May-2014
13 21.27.04
9 IMA 27
R
kV 130
ORAL & I V CONTRAST


R
10 cm
A
F
L

Role of PET-CT

- Advances in knowledge:
- Studies indicated that FDG PET-CT added benefit in gastric cancer staging by detecting more distant metastases, but these studies were generally of low quality and at high risk of bias.
- Intestinal subtype of gastric adenocarcinoma tended to be more FDG-avid and therefore more distant metastases were subsequently detected.

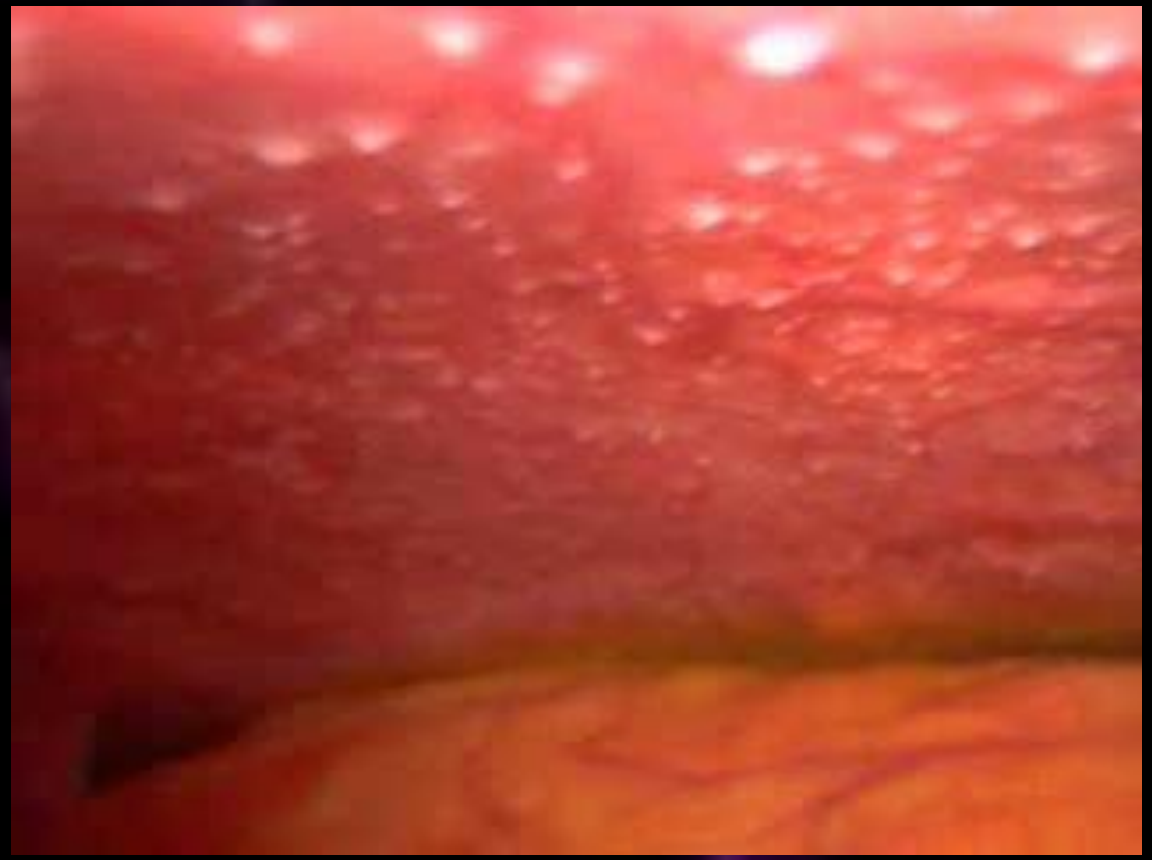


Kieran G Foley, Will Coomer, Bernadette Coles, Kevin M Bradley, The impact of baseline 18F-FDG PET-CT on the management and outcome of patients with gastric cancer: a systematic review, British Journal of Radiology, Volume 95, Issue 1139, 1 November 2022, 20220437, https://doi.org/10.1259/bjr.20220437

Baz, A.A., Hassan, T.A. Role of fused PET/CT compared to the standard contrast-enhanced CT in the follow-up assessment of the treated gastric malignancy. Egypt J Radiol Nucl Med 50, 95 (2019). https://doi.org/10.1186/s43055-019-0093-9

PRE-OPERATIVE WORK-UP

- **Staging Laparoscopy**
- More invasive but enormous benefit in visualization of liver stomach and peritoneal surface.
- Perhaps for all patients with more that T1 lesions.



PRE-OPERATIVE WORK-UP

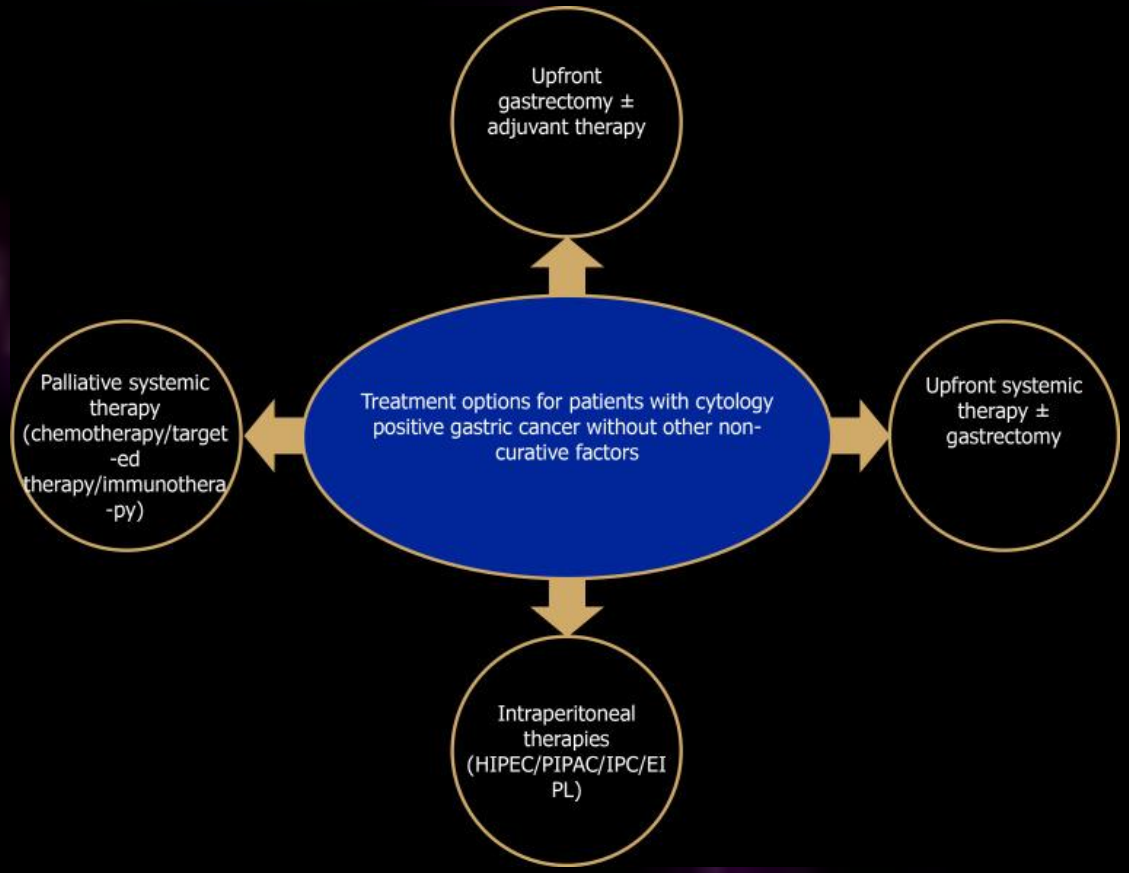
- **Peritoneal Cytology**
- Prognostic value of positive cytology findings from abdominal washings in patients with gastric cancer.
  - *Bonenkamp JJ, Songun I, Hermans J, van de Velde CJ Br J Surg. 1996 May;83(5):672-4.*
- The value of peritoneal cytology as a preoperative predictor in patients with gastric carcinoma undergoing a curative resection.
  - *Bentrem D, Wilton A, Mazumdar M, Brennan M, Coit D Ann Surg Oncol. 2005 May;12(5):347-53. Epub 2005 Mar 31.*

Peritoneal Cytology

?

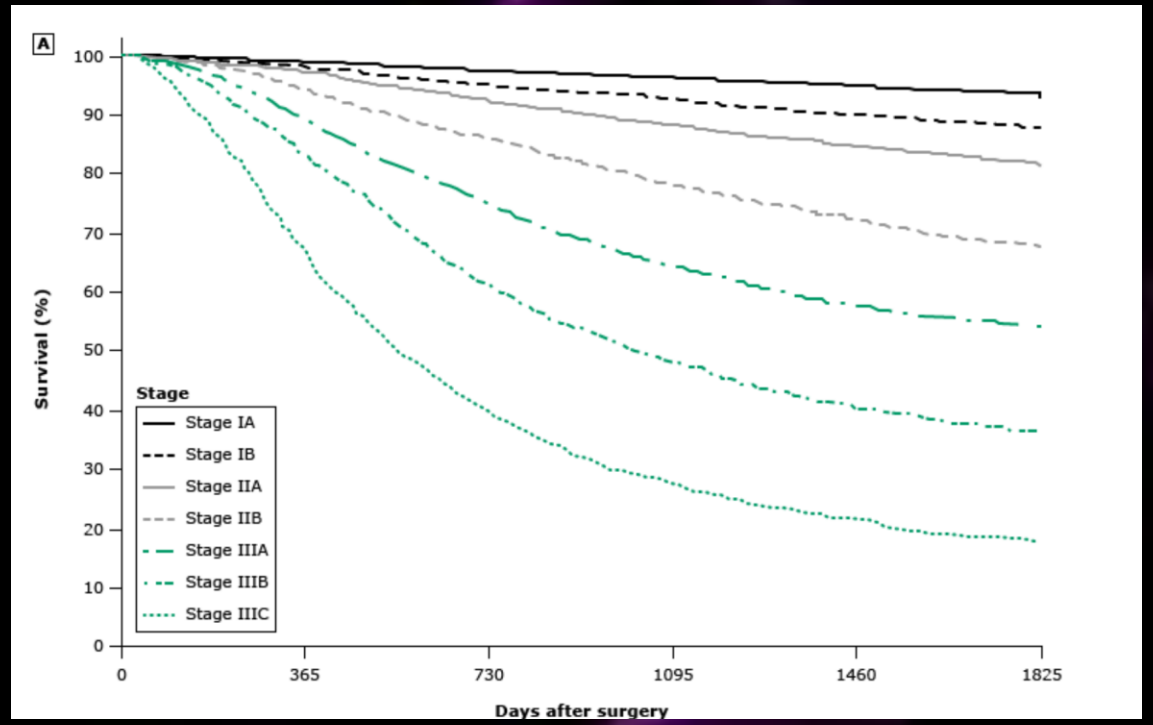
- Positive peritoneal cytology (Cy1) is associated with poor long-term outcomes; thus, these patients are considered as stage IV even if macroscopic carcinomatosis is absent.

Options from Surgical Adventurism >>>>>Nihilism

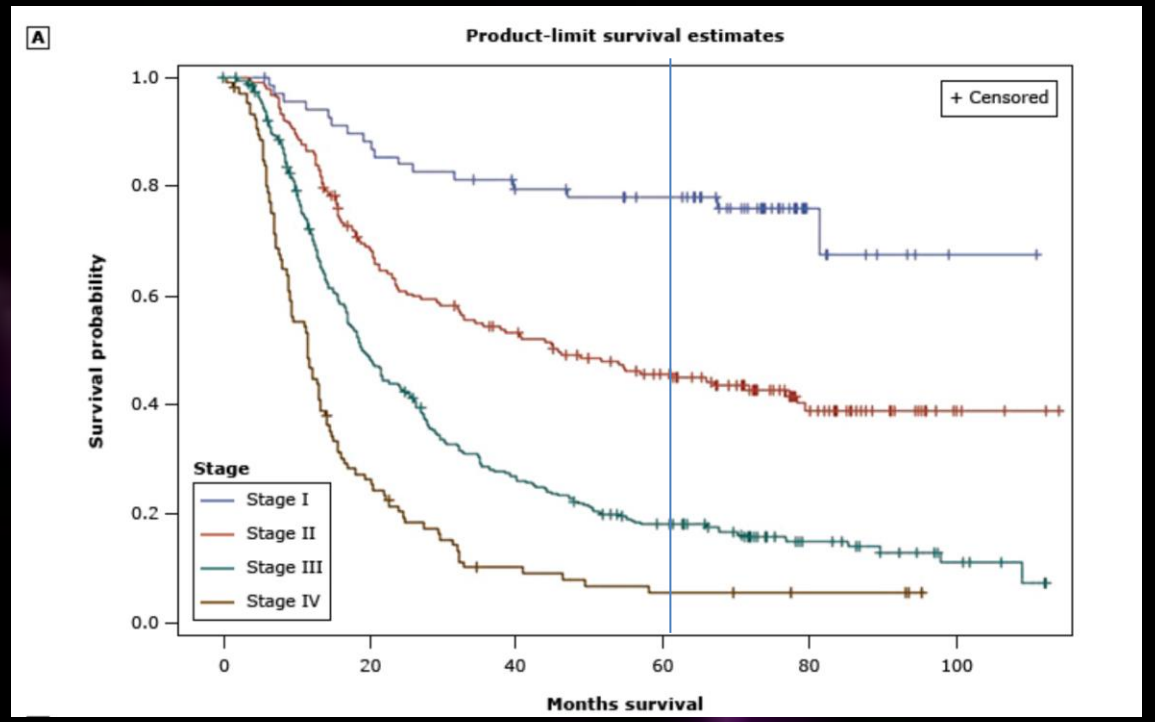


Bausys A, Gricius Z, Aniukstyte L, Luksta M, Bickaite K, Bausys R, Strupas K. Current treatment strategies for patients with only peritoneal cytology positive stage IV gastric cancer. World J Clin Cases. 2021 Nov 16;9(32):9711-9721. doi: 10.12998/wjcc.v9.i32.9711. PMID: 34877310; PMCID: PMC8610919.

ROLE OF NEOADJUVANT THERAPY



WITHOUT NEOADJUVANT THERAPY



WITH NEOADJUVANT THERAPY

AJCC Cancer Staging Manual, Eighth Edition (2017) published by Springer International Publishing.

EXTENT OF RESECTION

- EARLY GASTRIC CANCER – 2 cm margin
- INVASIVE GASTRIC CANCER –
  - 3 cm for intestinal variant
  - 5 cm for diffuse variant (?) – Consider frozen section from edge

EXTENT OF RESECTION

- In total, 17,086 patients were included.
- Conclusions: Our results show that TG is not associated with improved OS in patients who undergo gastrectomy for Gastric Adenocarcinoma, even when adjusted for tumor location. The survival differences are more pronounced in the (Signet-ring Gastric Carcinoma) SRGC histology variant.
- The worst survival is observed in patients with SRGC who undergo TG after adjusting for different covariates.

Moslim MA, Handorf E, Reddy SS, Greco SH, Farma JM. Partial Gastrectomy is Associated with Improved Overall Survival in Signet-Ring Cell Gastric Cancer. J Surg Res. 2021 Oct;266:27-34. doi: 10.1016/j.jss.2021.04.005. Epub 2021 May 8. PMID: 33975027.

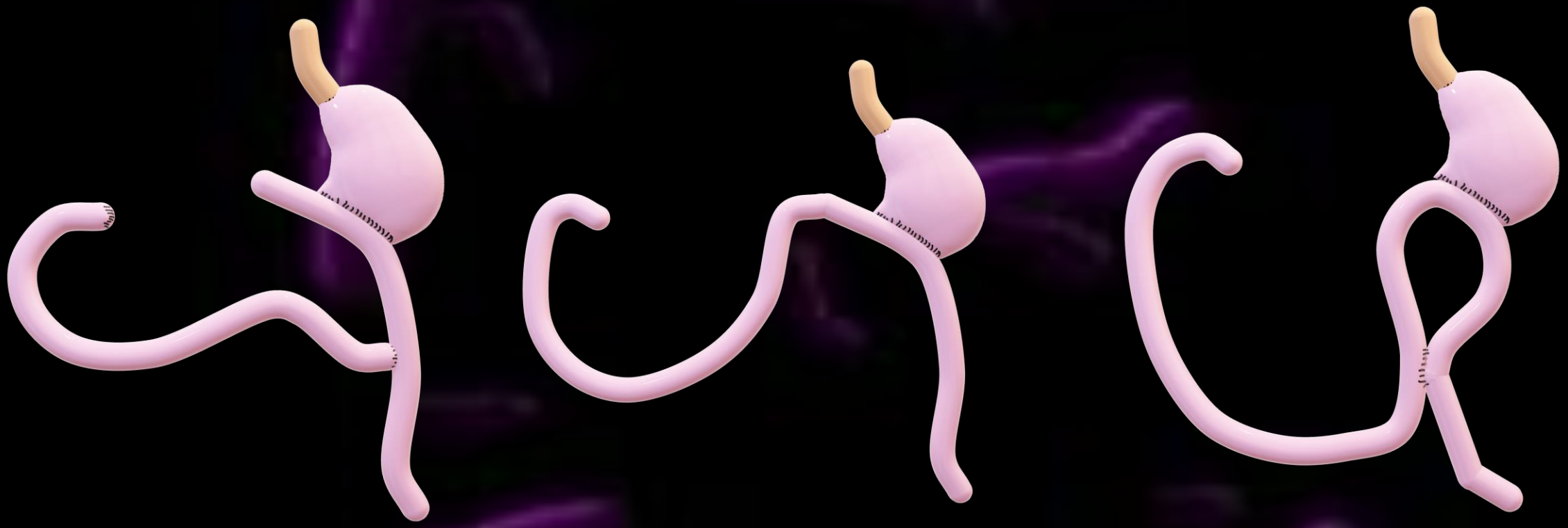
EXTENT OF RESECTION

- The multicenter LOGICA-trial randomized laparoscopic versus open D2-gastrectomy for resectable gastric adenocarcinoma (cT1–4aN0–3bM0) in 10 Dutch hospitals.
- DG was performed for non-proximal tumors if R0-resection was deemed achievable, TG for other tumors.
- If oncologically feasible, DG should be preferred over TG due to less complications, faster postoperative recovery, and better QoL while achieving equivalent oncological effectiveness.

de Jongh C, van der Veen A, Brosens LAA, Nieuwenhuijzen GAP, Stoot JHMB, Ruurda JP, van Hillegersberg R; LOGICA Study Group. Distal Versus Total D2-Gastrectomy for Gastric Cancer: a Secondary Analysis of Surgical and Oncological Outcomes Including Quality of Life in the Multicenter Randomized LOGICA-Trial. J Gastrointest Surg. 2023 Sep;27(9):1812-1824. doi: 10.1007/s11605-023-05683-z. Epub 2023 Jun 20. PMID: 37340107; PMCID: PMC10511620.

Reconstruction after Gastrectomy

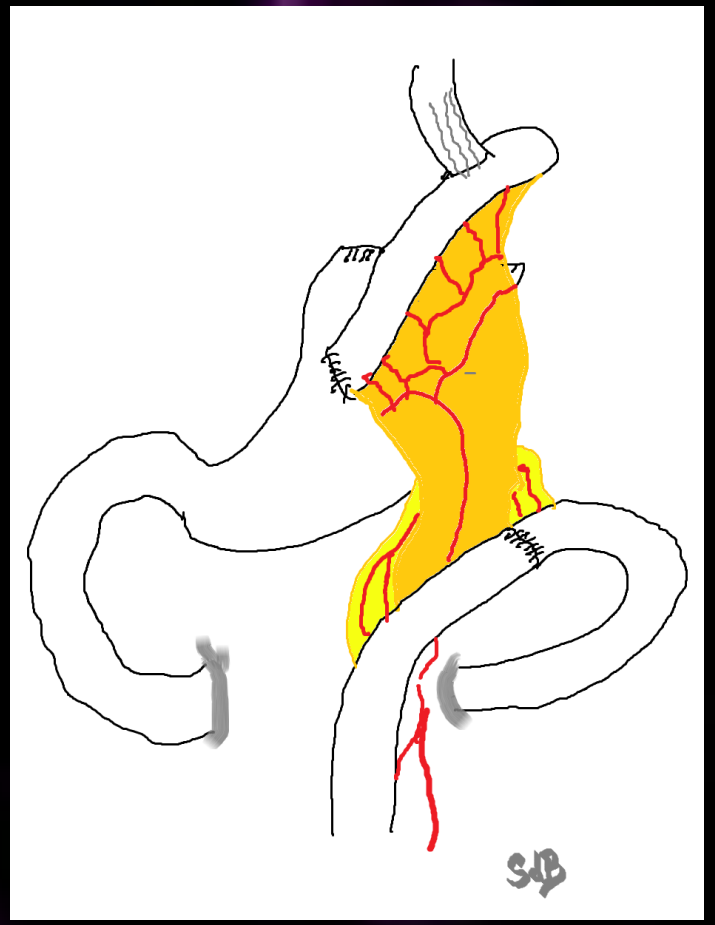
AFTER DISTAL GASTRECTOMY



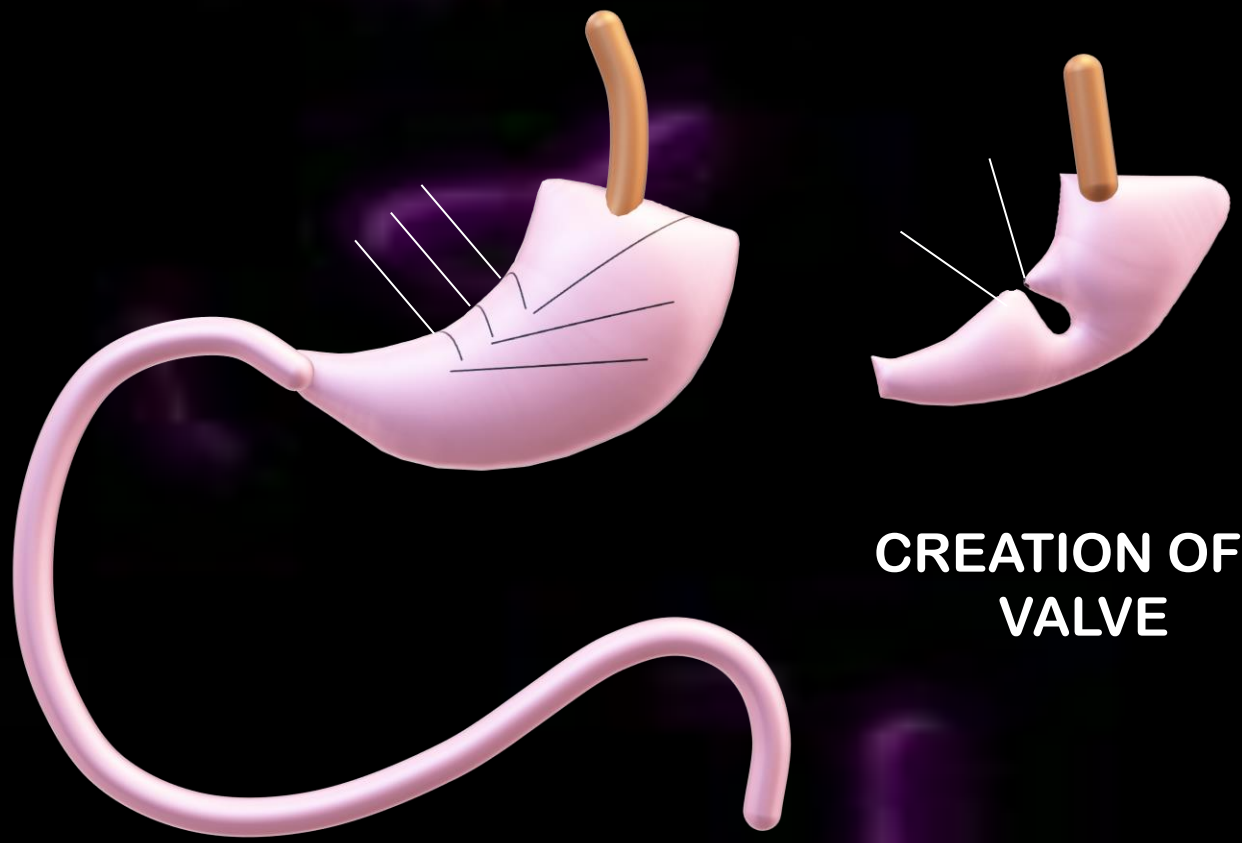
ROUX-EN-Y

BRAUN LOOP

AFTER PROXIMAL GASTRECTOMY

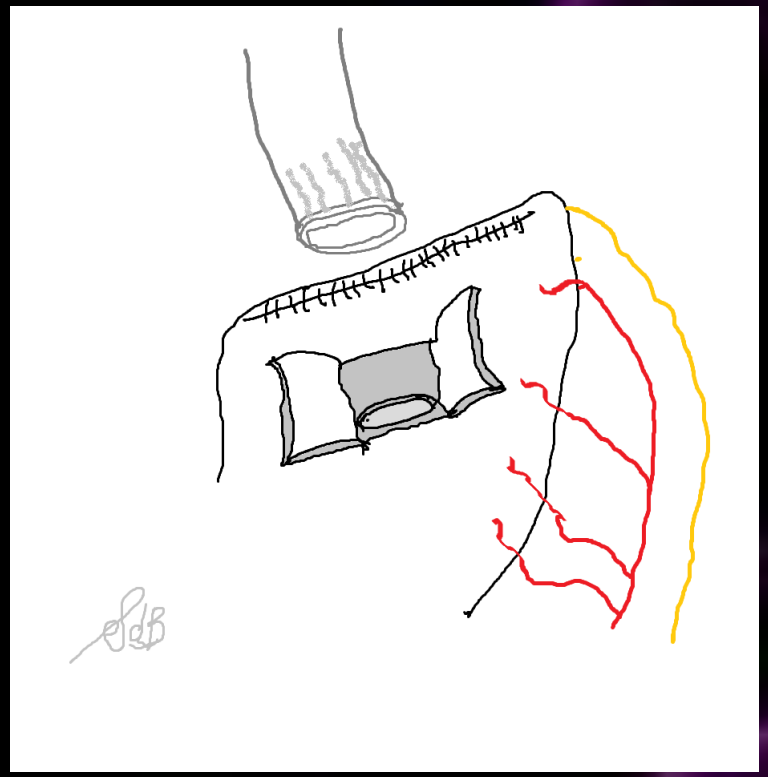


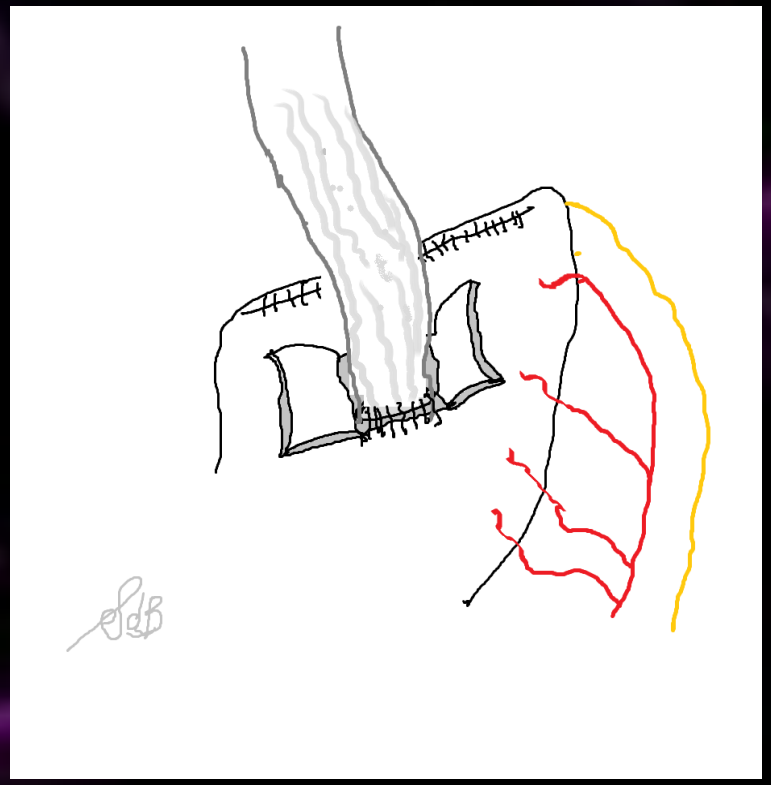
INTERPOSITION SEGMENT OF JEJUNUM

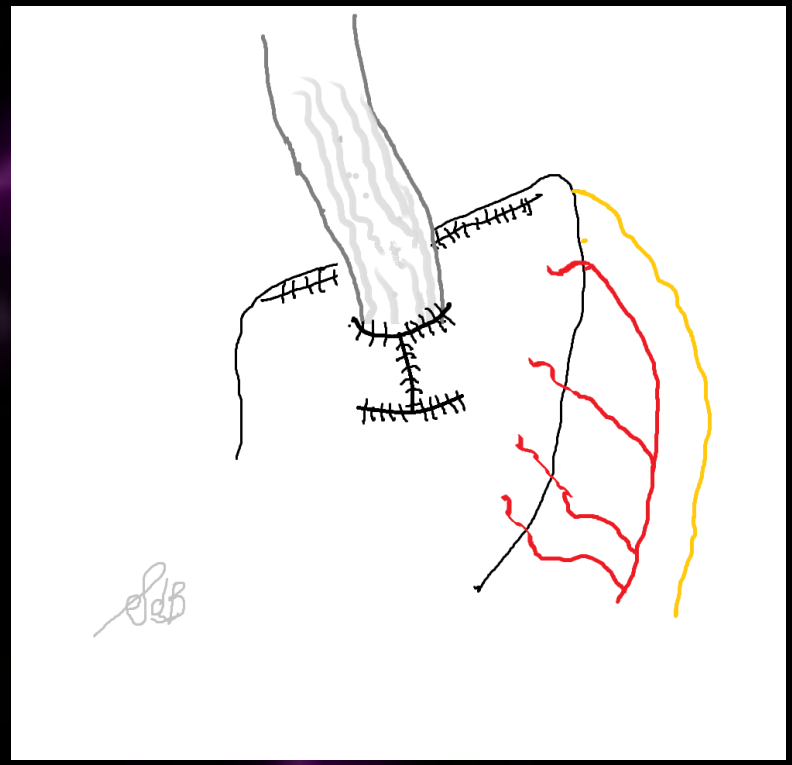


CREATION OF A VALVE

AFTER PROXIMAL GASTRECTOMY

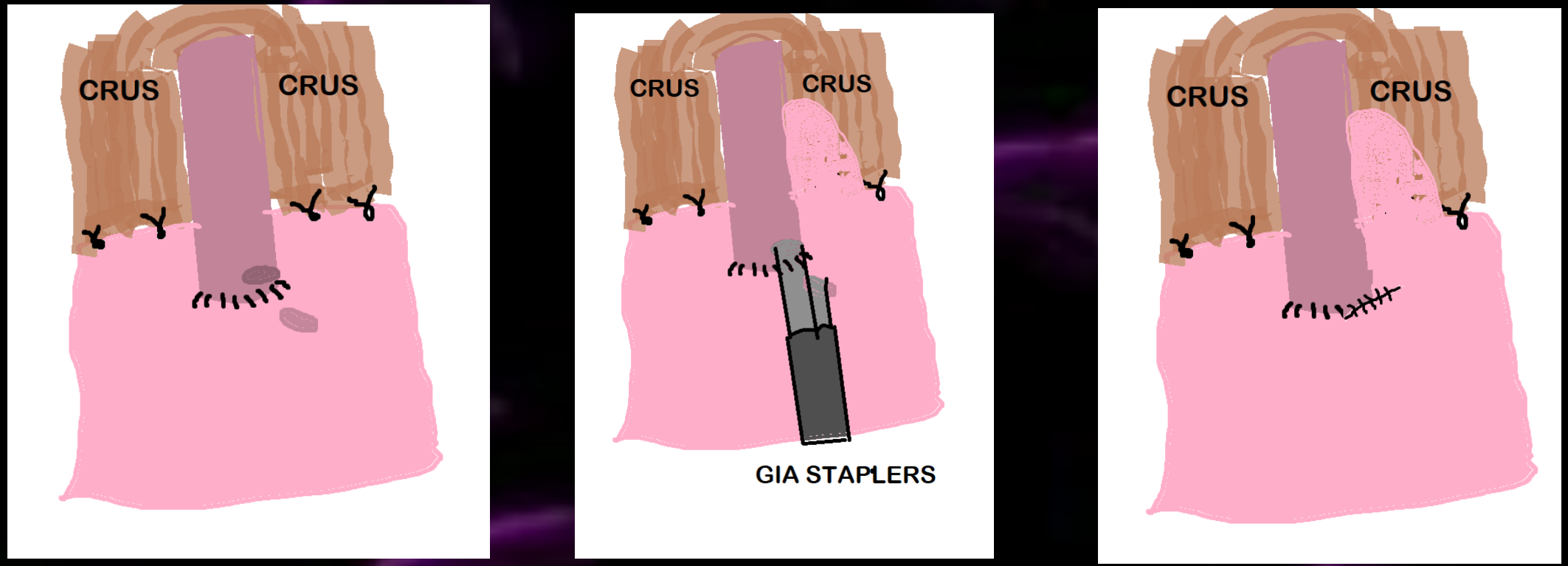






CREATION OF A GASTRO-OESOPHAGEAL VALVE

AFTER PROXIMAL GASTRECTOMY

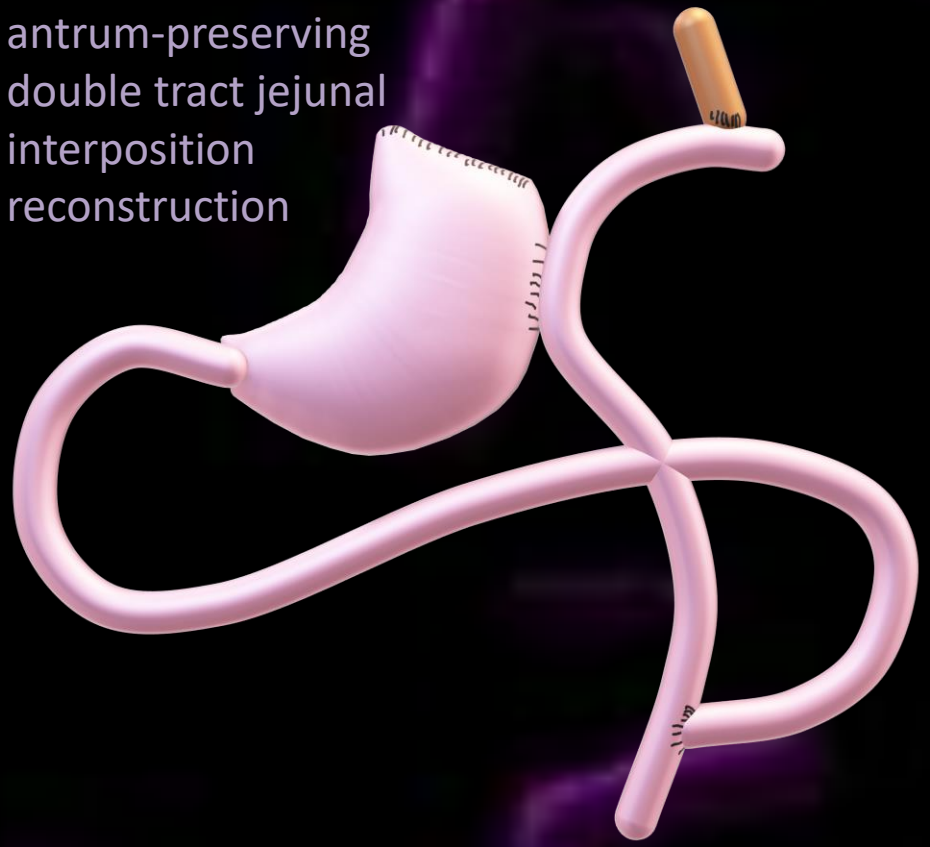


CREATION OF A GASTRO-OESOPHAGEAL VALVE

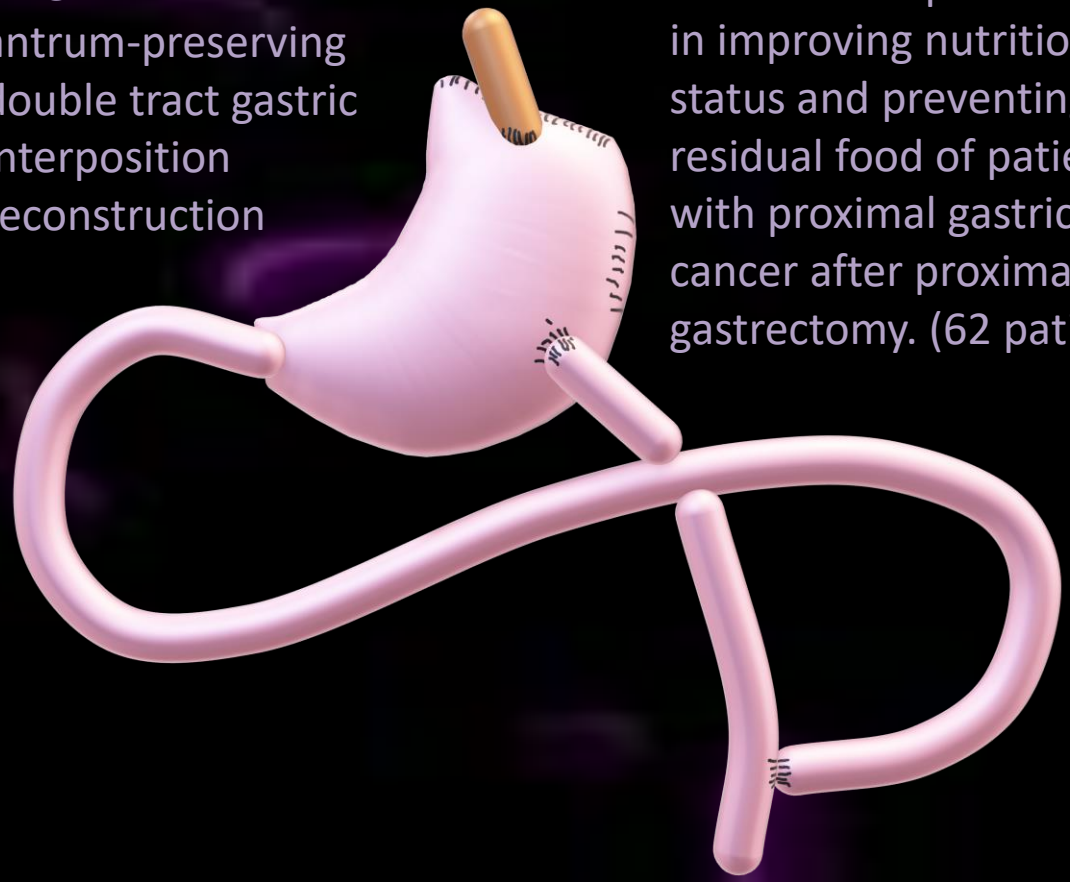
Yamashita, Y., Yamamoto, A., Tamamori, Y. et al. Side overlap esophagogastrostomy to prevent reflux after proximal gastrectomy. Gastric Cancer 20, 728–735 (2017). https://doi.org/10.1007/s10120-016-0674-5

AFTER PROXIMAL GASTRECTOMY

ADJR
antrum-preserving
double tract jejunal
interposition
reconstruction



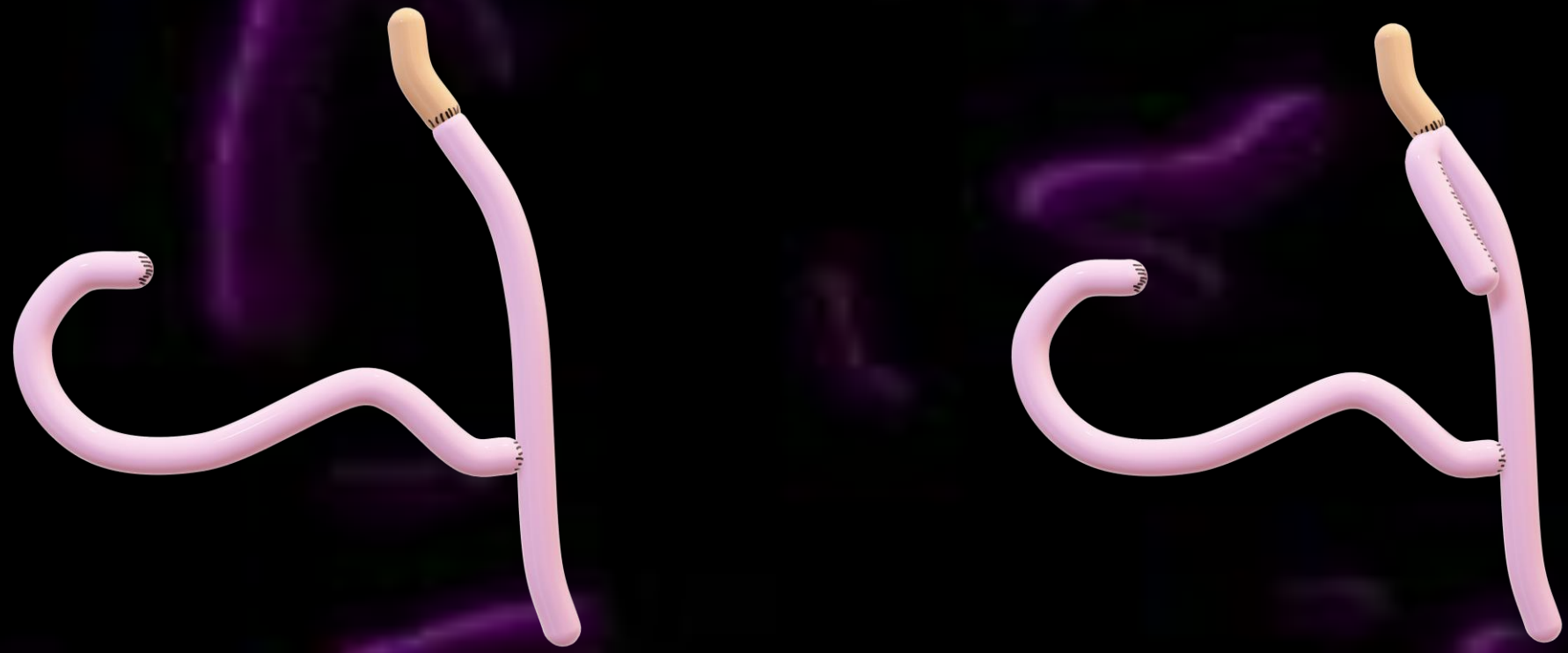
ADGR
antrum-preserving
double tract gastric
interposition
reconstruction

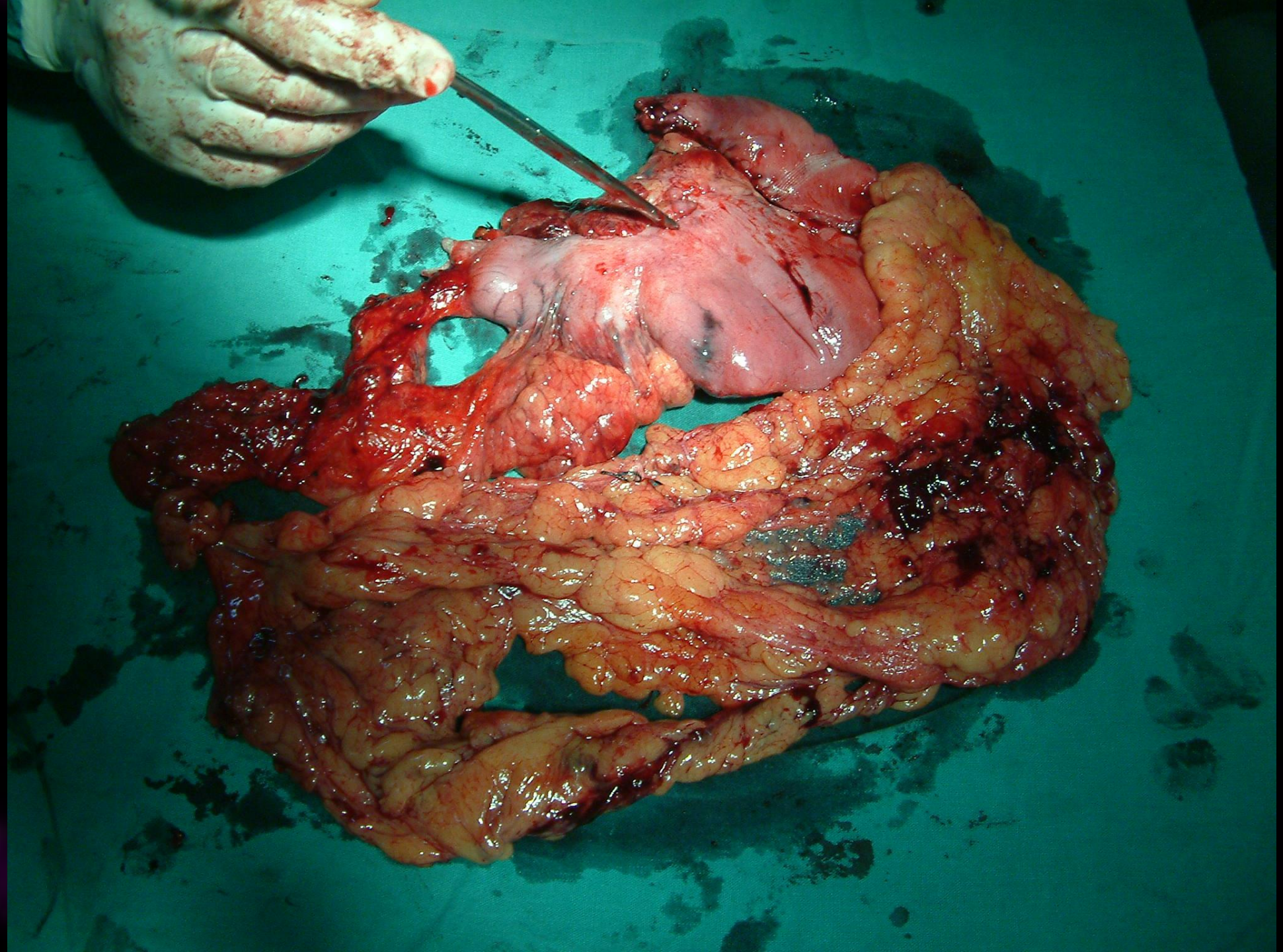


ADGR was superior to ADJR in improving nutritional status and preventing residual food of patients with proximal gastric cancer after proximal gastrectomy. (62 patients)

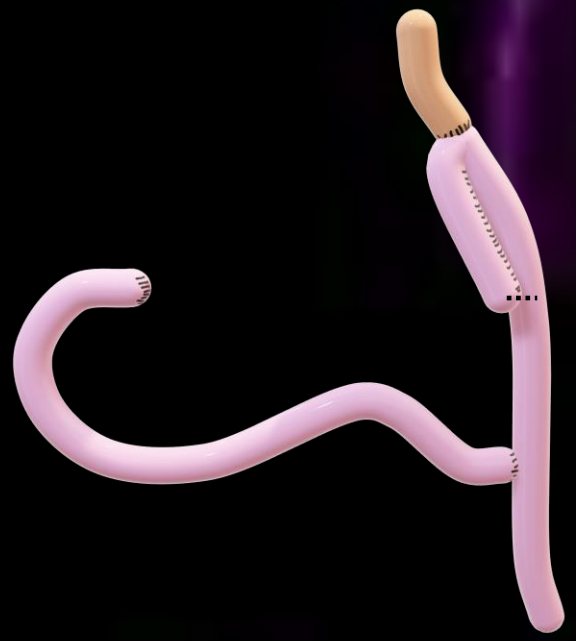
Yue C, Peng R, Wei W, Zhou B, Wen X, Gu R, Ming X, Li G, Chen H. Comparison on the Efficacy of Double Tract Gastric Interposition Reconstruction Versus Jejunal Interposition Reconstruction After Proximal Gastrectomy. Med Sci Monit. 2020 Jul 6;26:e922504. doi: 10.12659/MSM.922504. PMID: 32624566; PMCID: PMC7362707.

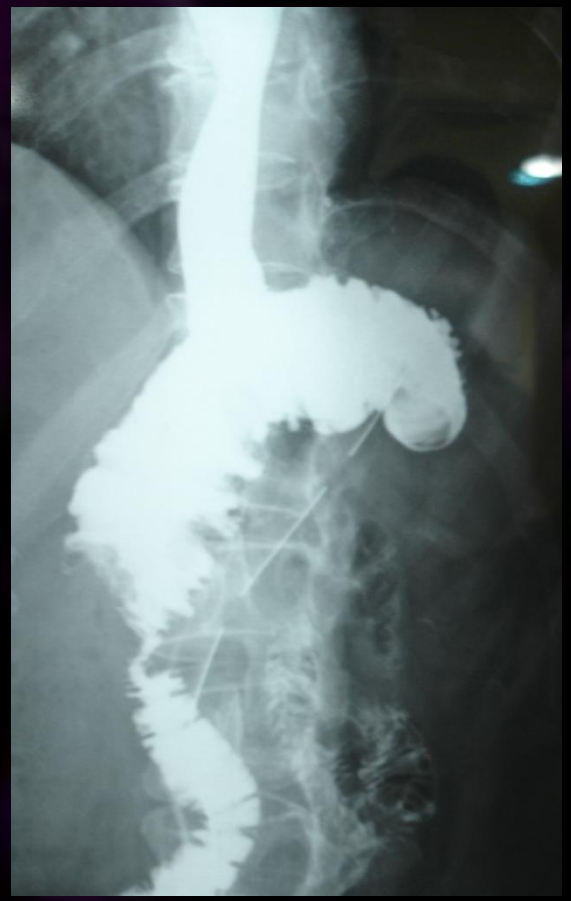
AFTER TOTAL GASTRECTOMY

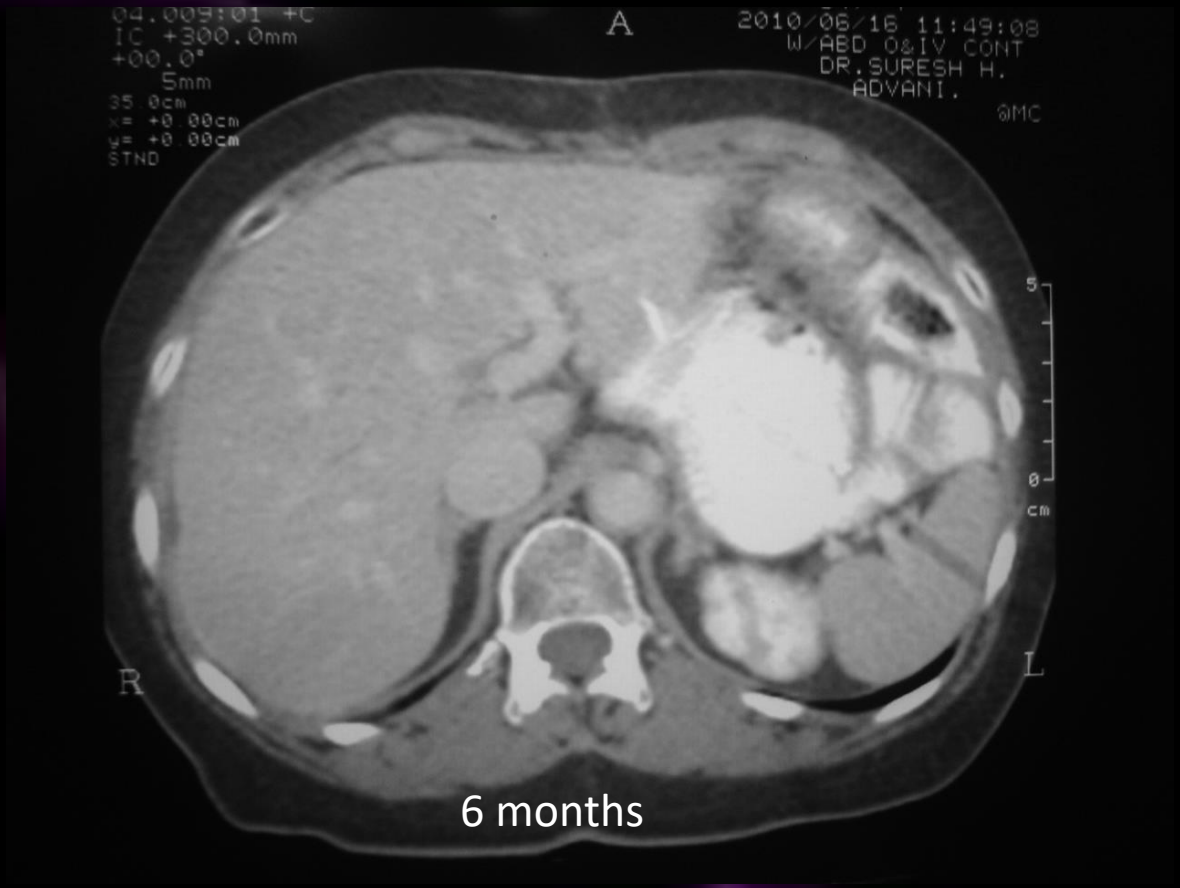




AFTER TOTAL GASTRECTOMY







6 months

Why Node dissection?

- Lymph node involvement is the most important indictor for overall survival (OS) of gastric cancer patients following curative resection (R0), and the survival rates markedly decrease with the increase in the number of metastatic lymph nodes.
- Researchers demonstrated that extended lymphadenectomy showed significant superiority in terms of lower locoregional recurrence and disease related deaths to limited lymphadenectomy in a 15-year follow-up study in 2010.

Songun I, Putter H, Kranenbarg EM, Sasako M, van de Velde CJ. Surgical treatment of gastric cancer: 15-year follow-up results of the randomised nationwide Dutch D1D2 trial. Lancet Oncol. 2010;11:439–449.

D2 or D1

- Treatment guidelines published by the National Comprehensive Cancer Network, Cancer Care Ontario, and European Society of Surgical Oncology recommend that D2 lymph node dissection is preferred over a lesser (D1) or greater (D3) dissection

Gastric cancer: ESMO Clinical Practice Guideline for diagnosis, treatment and follow-up. Lordick F, Carneiro F, Cascinu S, Fleitas T, Haustermans K, Piessen G, Vogel A, Smyth EC, ESMO Guidelines Committee. Electronic address: clinicalguidelines@esmo.org Ann Oncol. 2022;33(10):1005. Epub 2022 Jul 29.

D1+?

- D1 plus nodes along the main neurovascular arcades (coeliac, left gastric, hepatic, and splenic arteries).
- Minimum harvest should be at least 16 nodes.

Staging and surgical approaches in gastric cancer: a clinical practice guideline. Coburn N, Cosby R, Klein L, Knight G, Malthaner R, Mamazza J, Mercer CD, Ringash J Curr Oncol. 2017;24(5):324. Epub 2017 Oct 25.

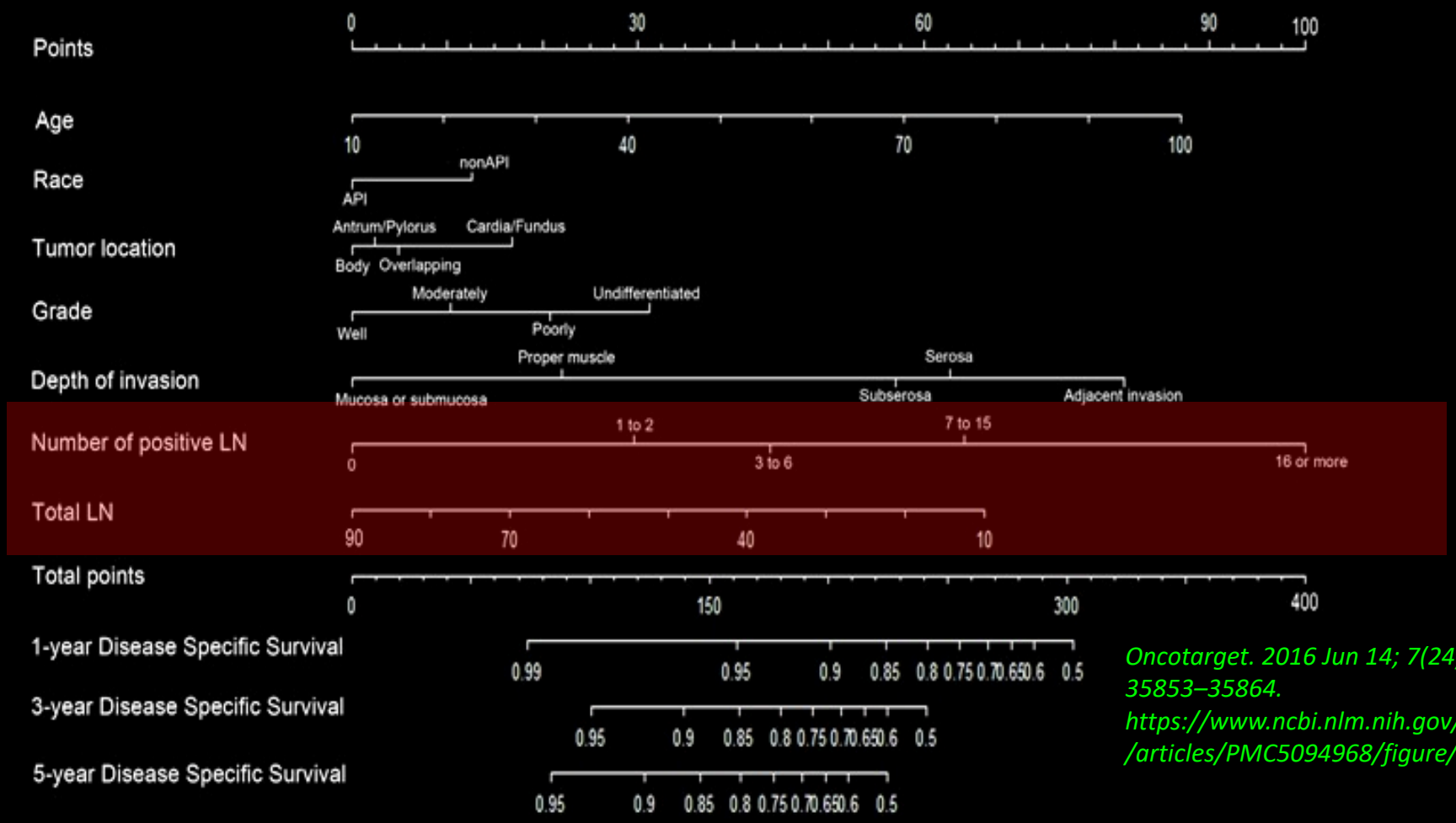
Why D_2?

- Extent of lymphadenectomy in patients with gastric cancer. Cochrane Upper GI and Pancreatic Diseases Group; August 2015; Mocellin S, McCulloch P, Kazi H, Gama-Rodrigues JJ, Yuan Y, Nitti D
- D2 lymphadenectomy can improve DSS in patients with resectable carcinoma of the stomach, although the increased incidence of postoperative mortality reduces its therapeutic benefit.

Oncotarget
Open Access Impact Journal

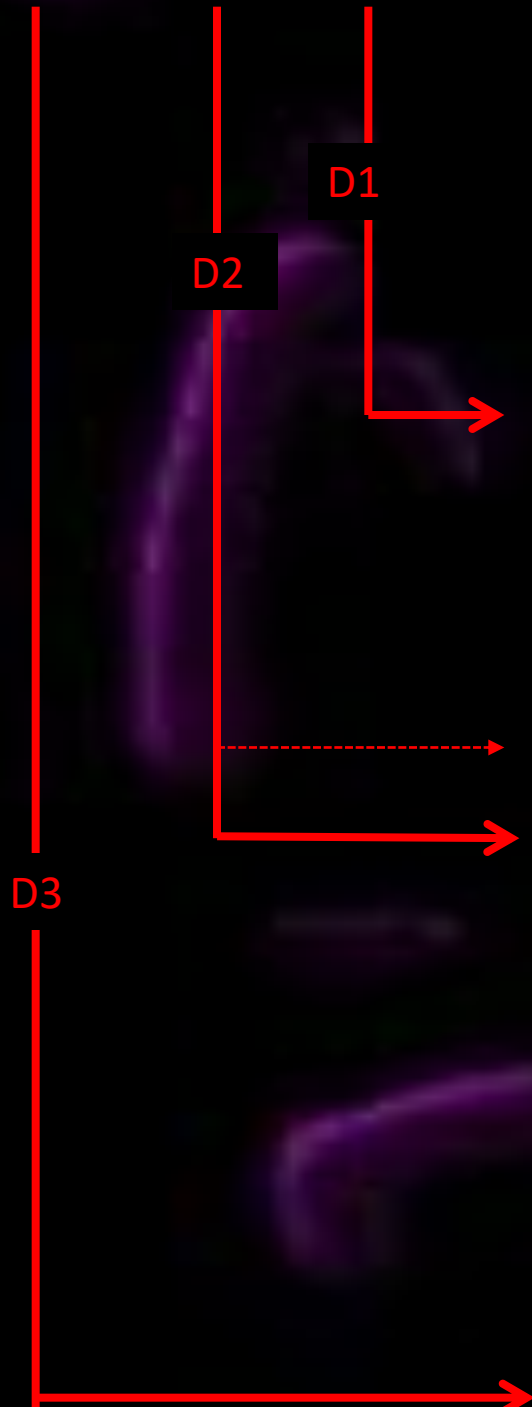
Why D_2?

Figure 1



Oncotarget. 2016 Jun 14; 7(24): 35853–35864.
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5094968/figure/F1/

Nomogram predicting 1–year, 3–year and 5–year DSS for RGC patients after curative resection



Shackelford

1. Right cardiac
2. Left cardiac
3. Nodes along lesser curve
4. Nodes along greater curve
5. Supra-pyloric nodes
6. Infra-pyloric nodes
7. Nodes along left gastric artery
8. Nodes along common hepatic
9. Nodes along coeliac nodes
10. Nodes at the splenic hilum
11. Nodes along splenic artery
12. Nodes at the hepatoduodenal ligament
13. Retropancreatic nodes
14. Nodes along the superior mesenteric vessels
15. Nodes along the middle colic
16. Para aortic
17. Nodes of anterior pancreatic surface
18. Inferior pancreatic nodes
19. Infra diaphragmatic nodes
20. Nodes at oesophageal hiatus

LN number	LN description	SITE OF CANCER			
		ANTRUM	MIDDLE	CARDIA	CARDIA & OESOPHAGEAL
1	Right Cardiac	N2	N1	N1	N1
2	Left Cardiac		N1	N1	N1
3	Lesser Curve	N1	N1	N1	N1
4sa	Short Gastric	N1	N1	N1	N1
4sb	Left Gastroepiploic	N1	N1	N1	N1
4d	Right Gastroepiploic	N1	N1	N2	N2
5	Suprapyloric	N1	N1	N2	N2
6	Infrapyloric	N1	N1	N2	N2
7	Left Gastric artery	N2	N2	N2	N2
8a	Anterior hepatic artery	N2	N2	N2	N2
9	Coeliac artery	N2	N2	N2	N2
10	Splenic hilum		N2	N2	N2
11	Splenic artery		N2	N2	N2
19	Infradiaphragmatic				N2
20	Oesophageal hiatal			N2	N1
110	Lower oesophageal				N2
111	Supradiaphragmatic				N2

Bailey & Love

Location / Lymph node station		LMU / MUL MLU / UML	LD / L	LM / M / ML	MU / UM	U	E+
No. 1	rt paracardial	1	2	1	1	1	
No. 2	lt paracardial	1	M	3	1	1	
No. 3	lesser curvature	1	1	1	1	1	
No. 4sa	short gastric	1	M	3	1	1	
No. 4sb	lt gastroepiploic	1	3	1	1	1	
No. 4d	rt gastroepiploic	1	1	1	1	2	
No. 5	suprapyloric	1	1	1	1	3	
No. 6	infrapyloric	1	1	1	1	3	
No. 7	lt gastric artery	2	2	2	2	2	
No. 8a	ant comm hepatic	2	2	2	2	2	
No. 8b	post comm hepatic	3	3	3	3	3	
No. 9	celiac artery	2	2	2	2	2	
No. 10	splenic hilum	2	M	3	2	2	
No. 11p	proximal splenic	2	2	2	2	2	
No. 11d	distal splenic	2	M	3	2	2	
No. 12a	lt hepatoduodenal	2	2	2	2	3	
No. 12b,p	post hepatoduod	3	3	3	3	3	
No. 13	retropancreatic	3	3	3	M	M	
No. 14v	sup mesenteric v.	2	2	3	3	M	
No. 14a	sup mesenteric a.	M	M	M	M	M	
No. 15	middle colic	M	M	M	M	M	
No. 16a1	aortic hiatus	M	M	M	M	M	
No. 16a2,b1	paraaortic, middle	3	3	3	3	3	
No. 16b2	paraaortic, caudal	M	M	M	M	M	
No. 17	ant pancreatic	M	M	M	M	M	
No. 18	inf pancreatic	M	M	M	M	M	
No. 19	infradiaphragmatic	3	M	M	3	3	2
No. 20	esophageal hiatus	3	M	M	3	3	1
No. 110	lower paraesophag	M	M	M	M	M	3
No. 111	supradiaphragmatic	M	M	M	M	M	3
No. 112	post mediastinal	M	M	M	M	M	3

M : lymph nodes regarded as distant metastasis

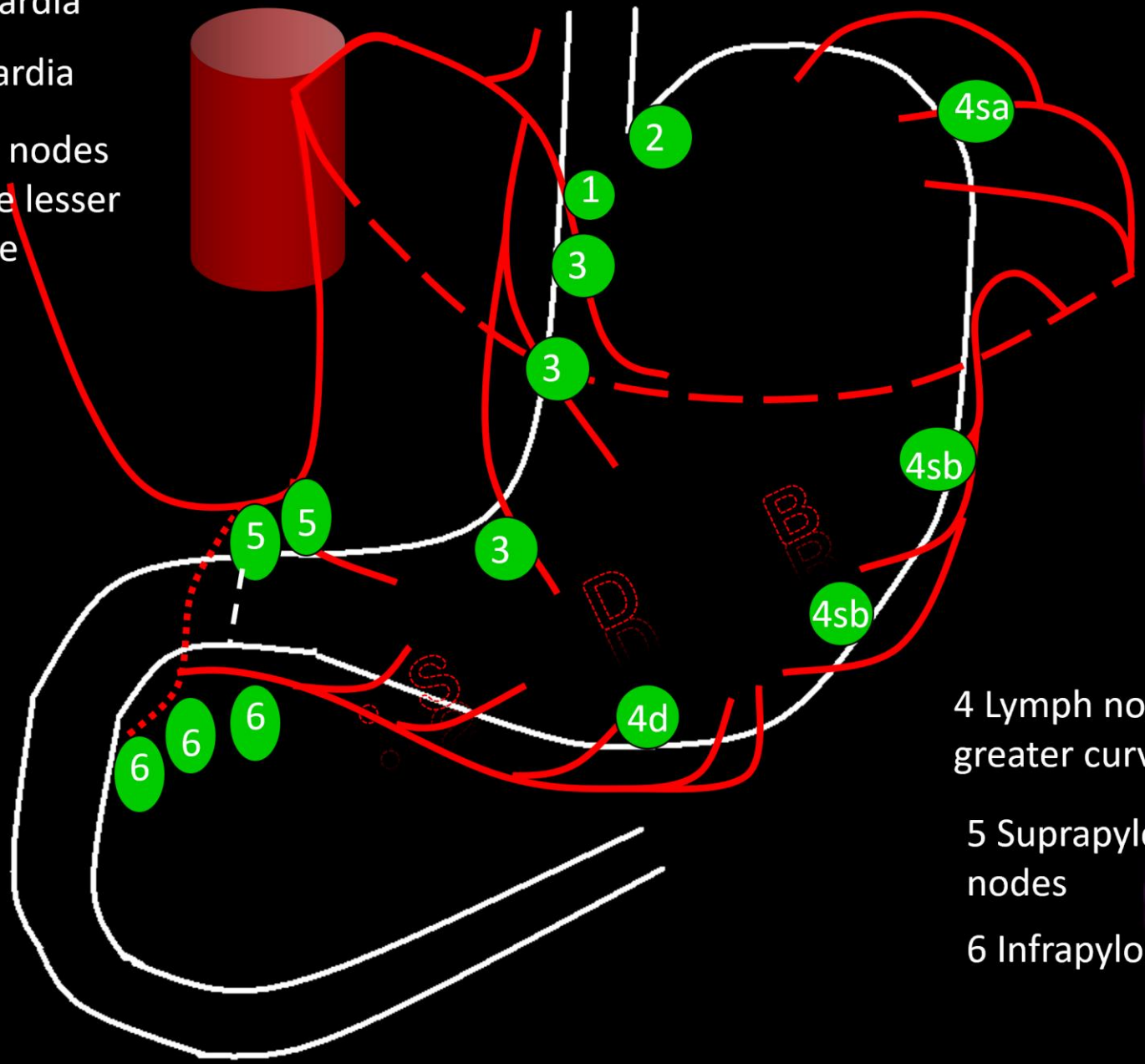
E+ : lymph node stations re-classified in cases of esophageal invasion

Japanese

1-Right cardia

2- Left cardia

3 Lymph nodes along the lesser curvature



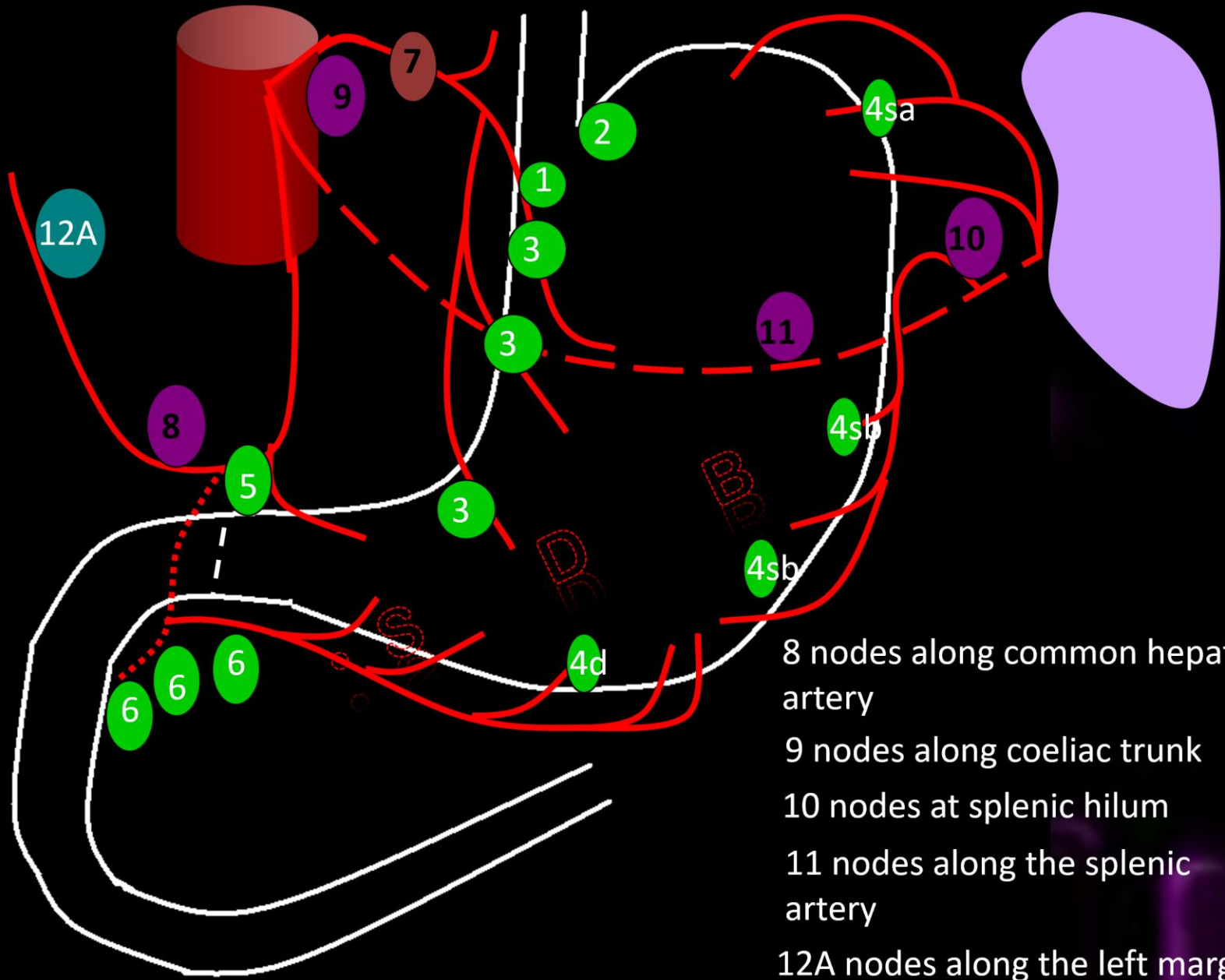
4 Lymph nodes along the greater curvature

5 Suprapyloric lymph nodes

6 Infrapyloric lymph nodes

D1 DISSECTION; N1 LEVEL

7 nodes along left gastric



D2 DISSECTION; N2 LEVEL

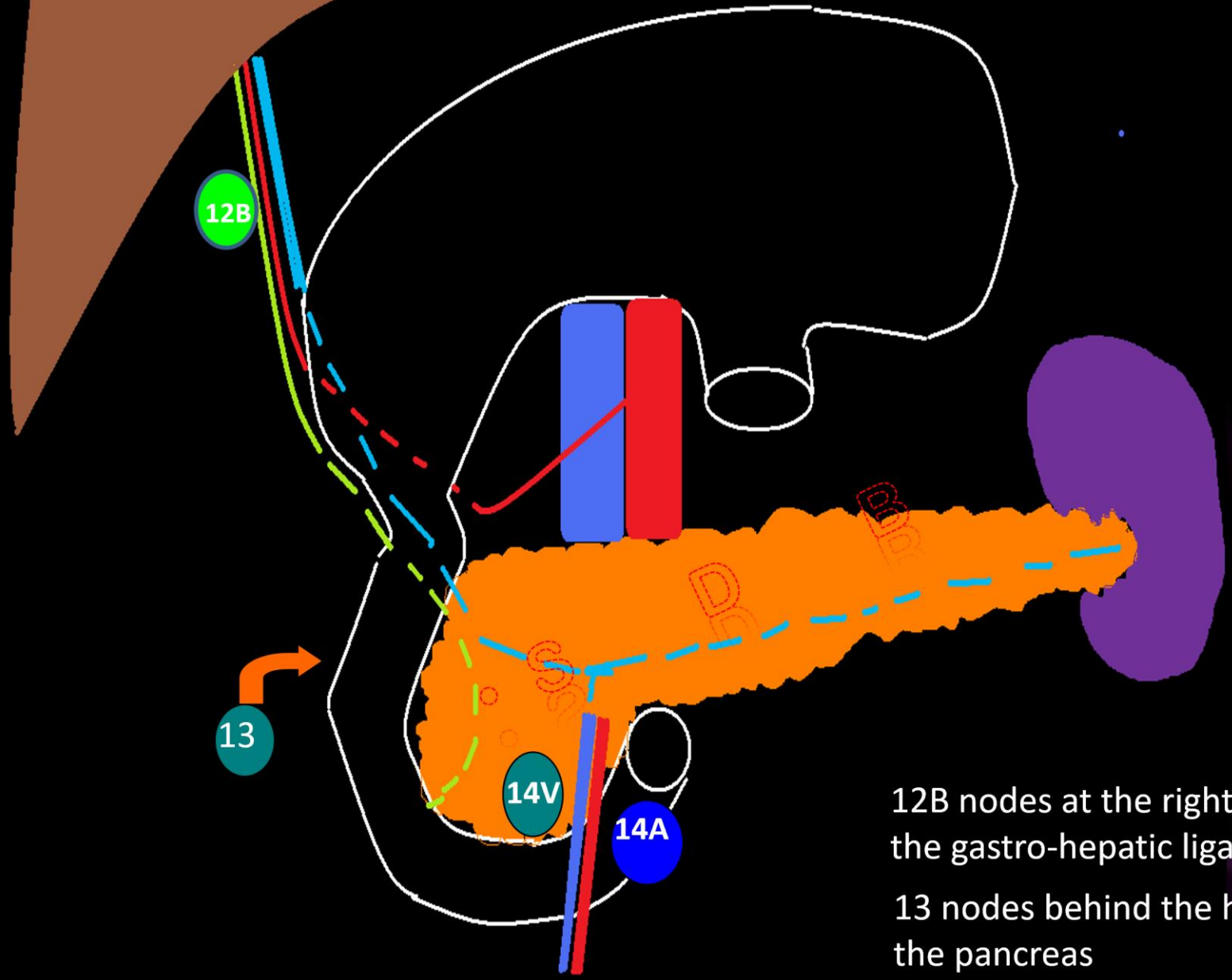
8 nodes along common hepatic artery

9 nodes along coeliac trunk

10 nodes at splenic hilum

11 nodes along the splenic artery

12A nodes along the left margin of the gastro-hepatic ligament

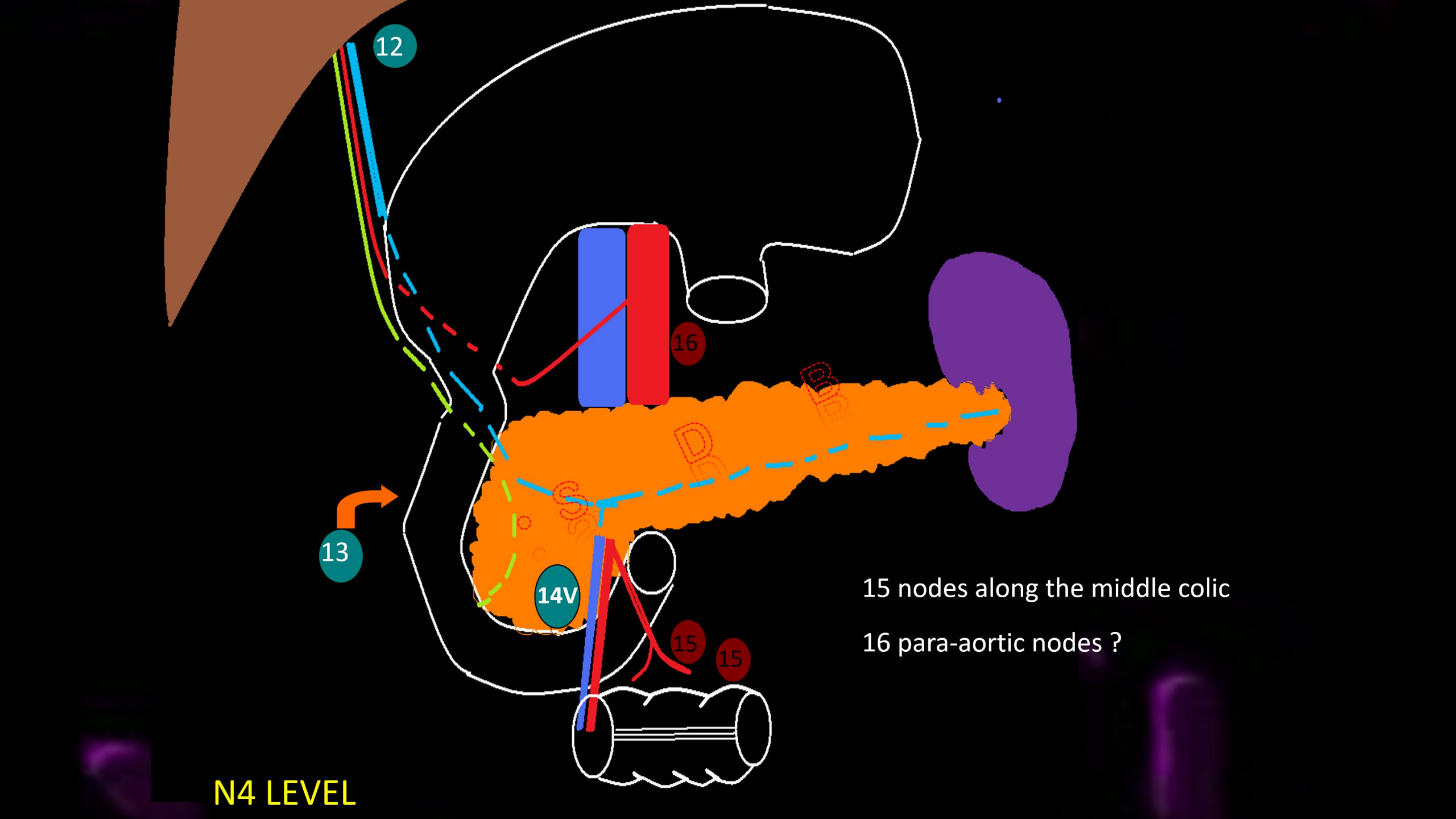


12B nodes at the right side of the gastro-hepatic ligament

13 nodes behind the head of the pancreas

14 nodes along the root of the mesentery

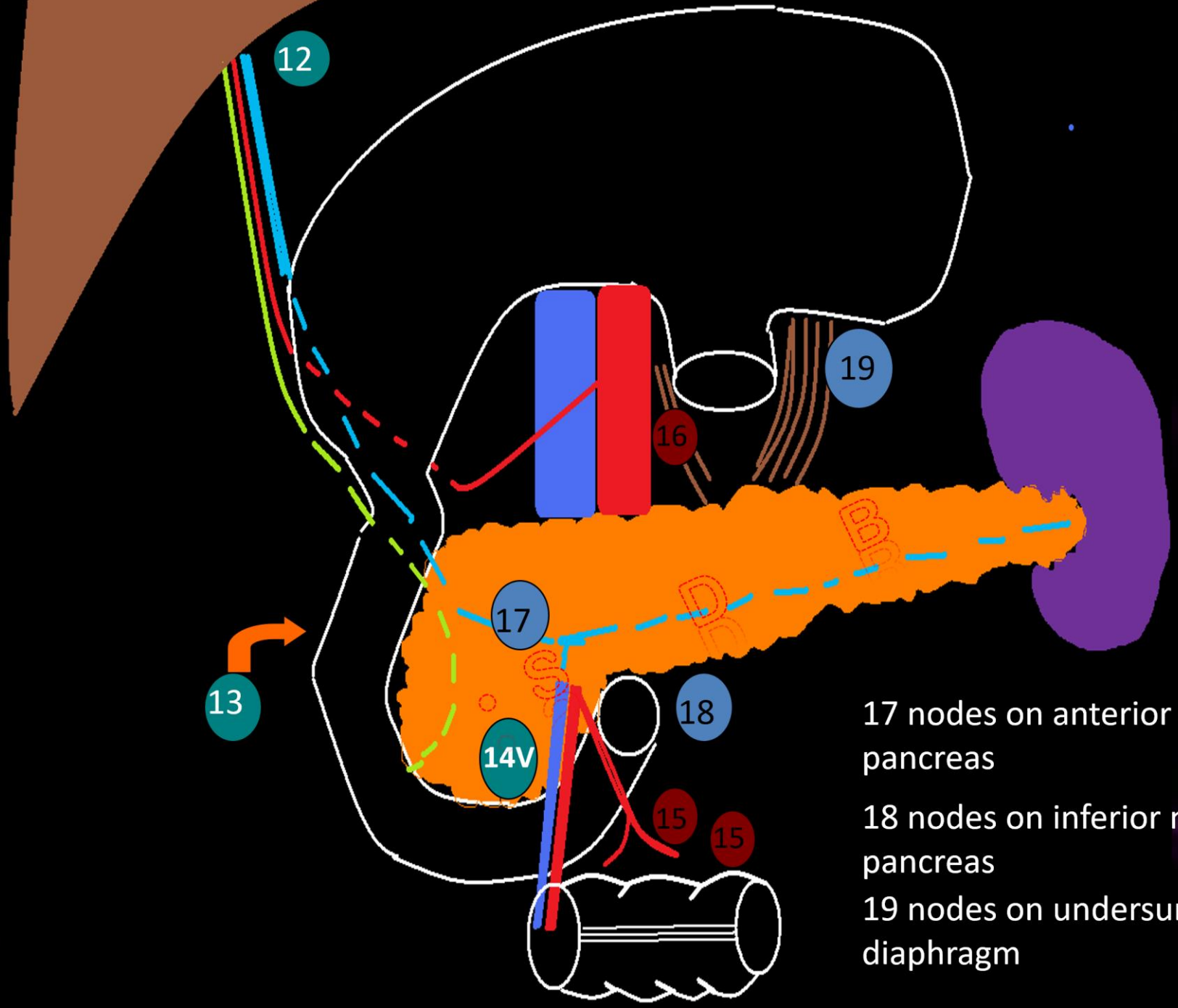
D3 DISSECTION; N3 LEVEL



15 nodes along the middle colic

16 para-aortic nodes ?

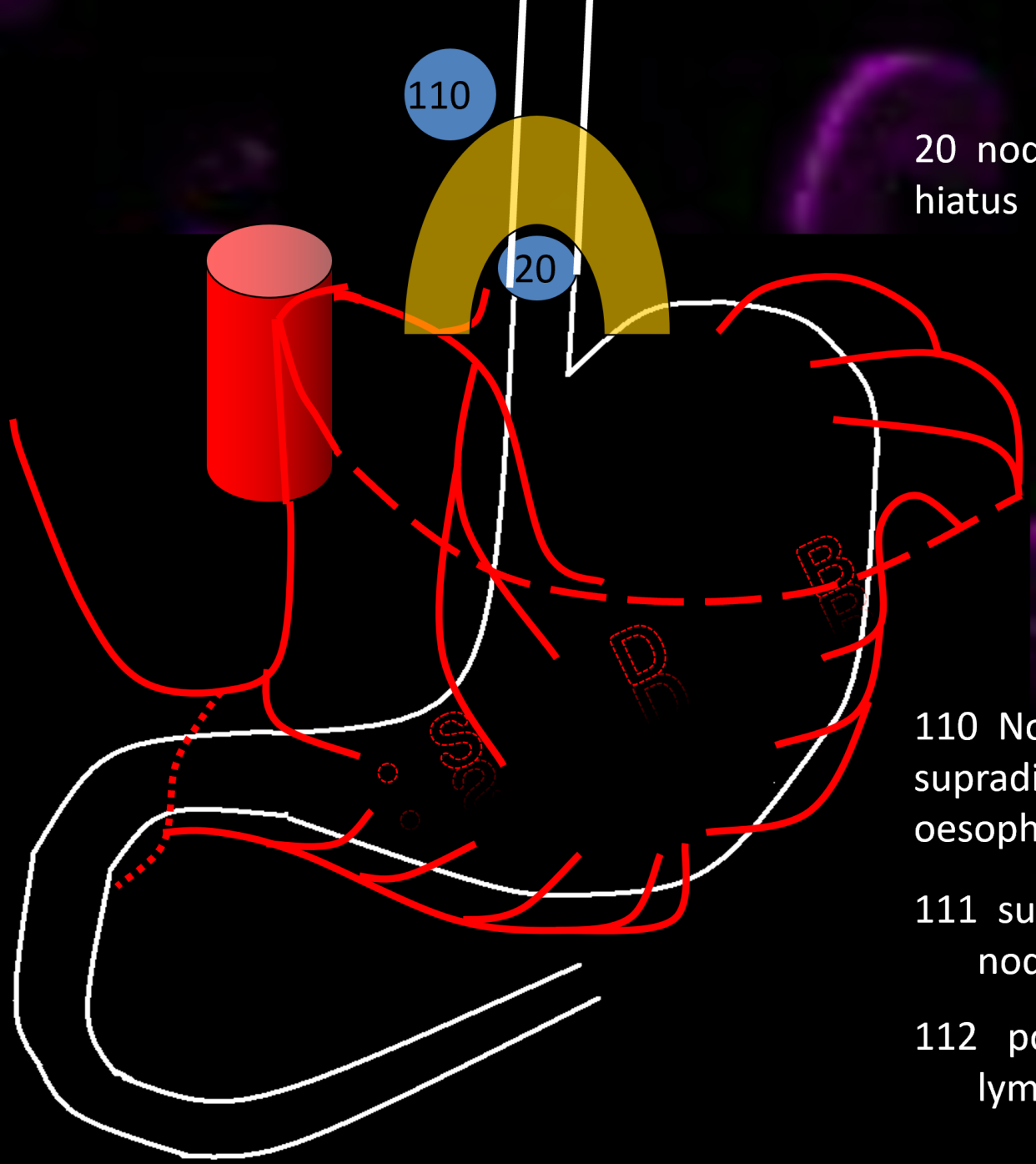
N4 LEVEL



17 nodes on anterior surface of pancreas

18 nodes on inferior margin of pancreas

19 nodes on undersurface of diaphragm



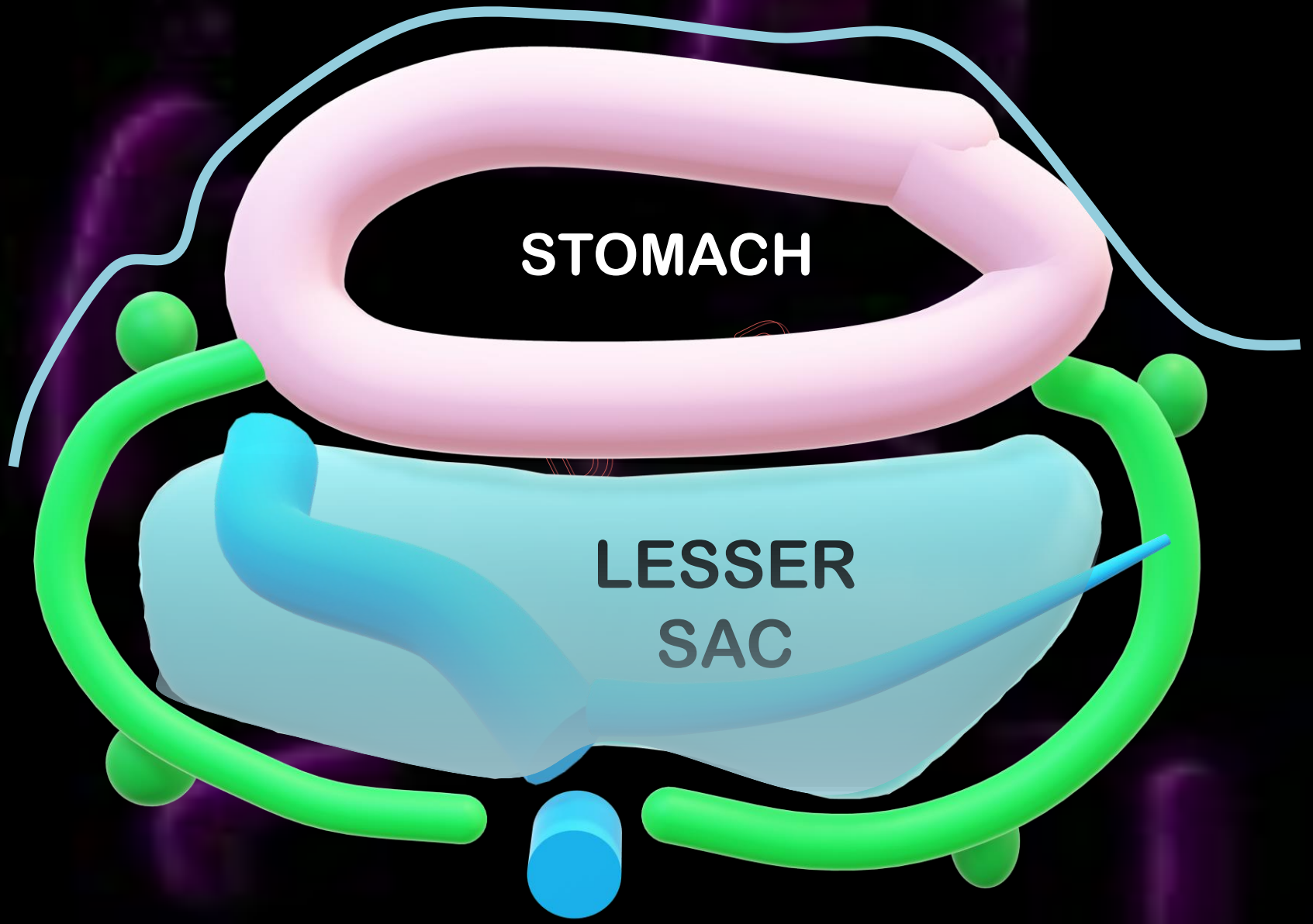
20 nodes at the oesophageal hiatus

110 Nodes along the supradiaphragmatic oesophagus

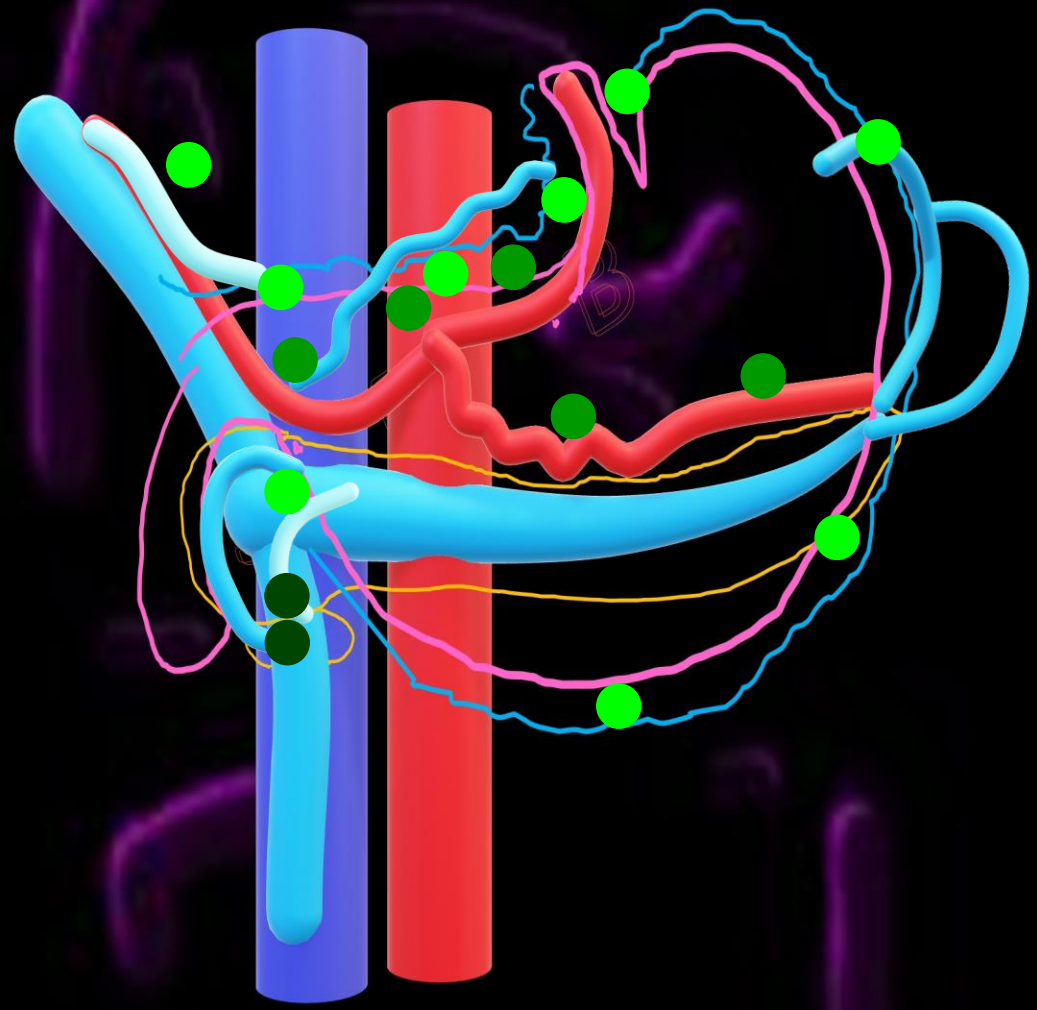
111 supra-diaphragmatic lymph nodes

112 posterior mediastinal lymph nodes

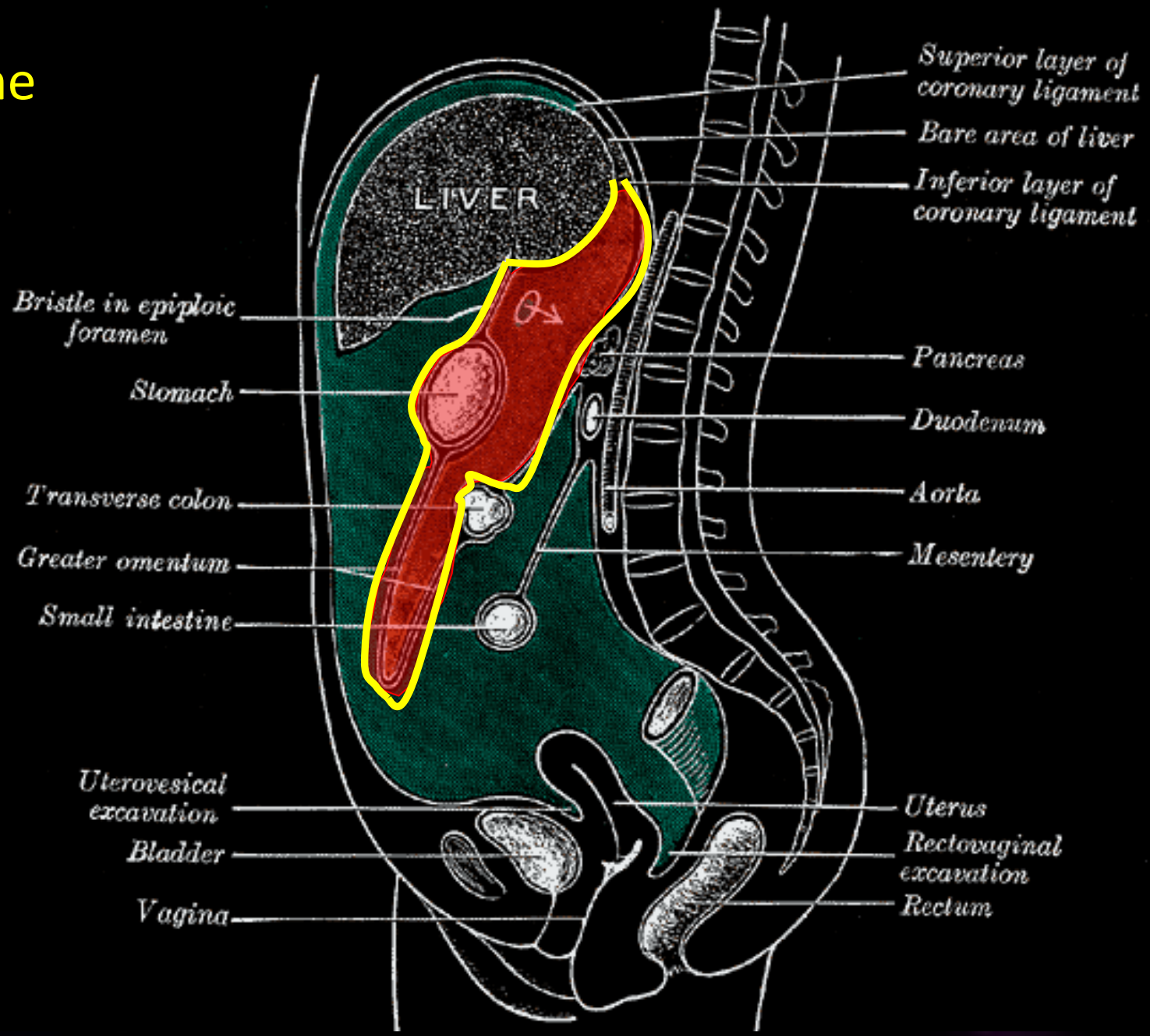
An in-Utero Rotation


STOMACH
LESSER
SAC

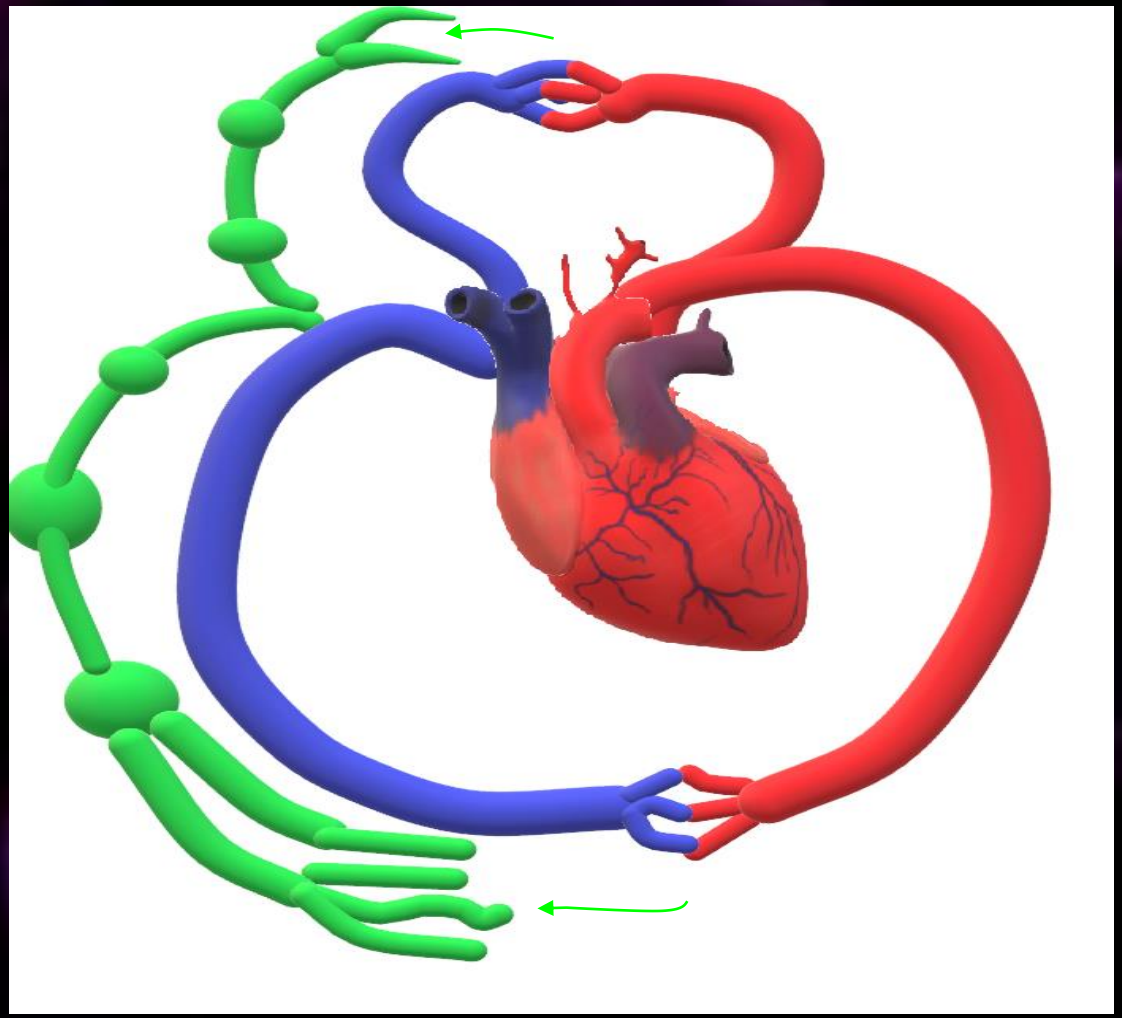
D1 nodes
D2 nodes



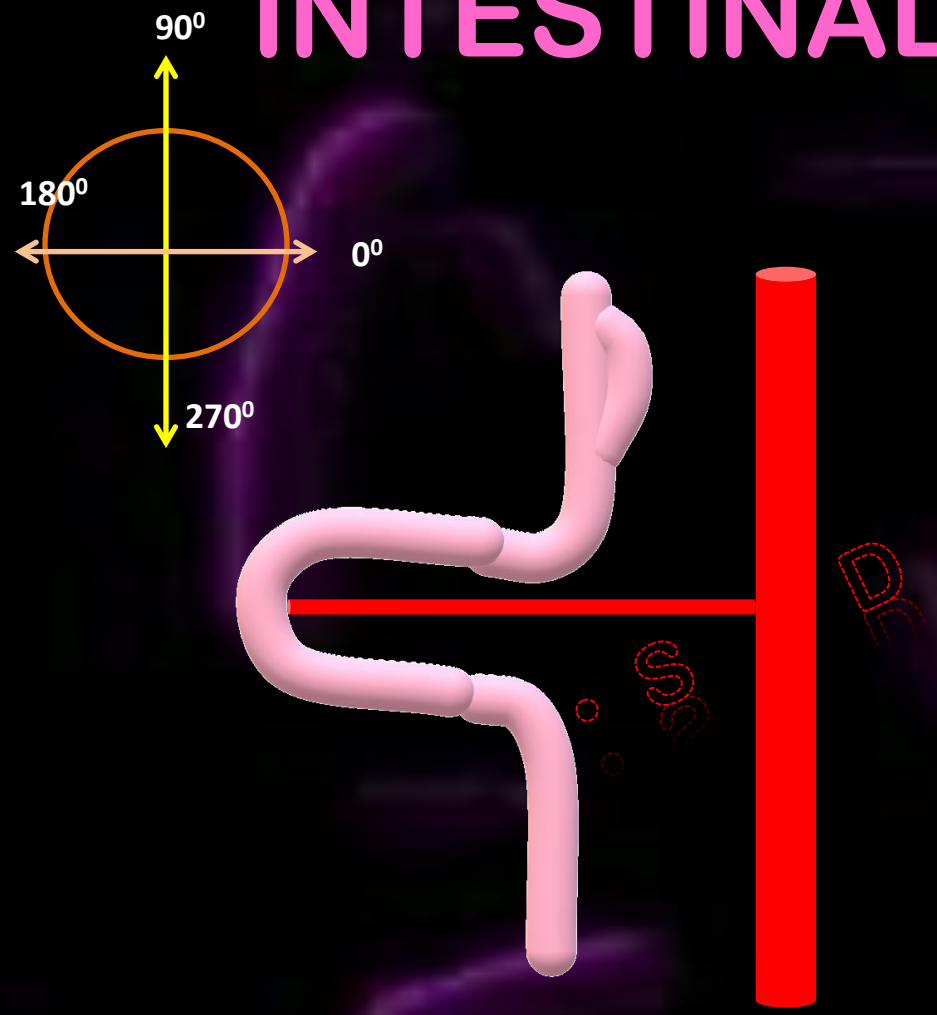
Why is the operation done this way?



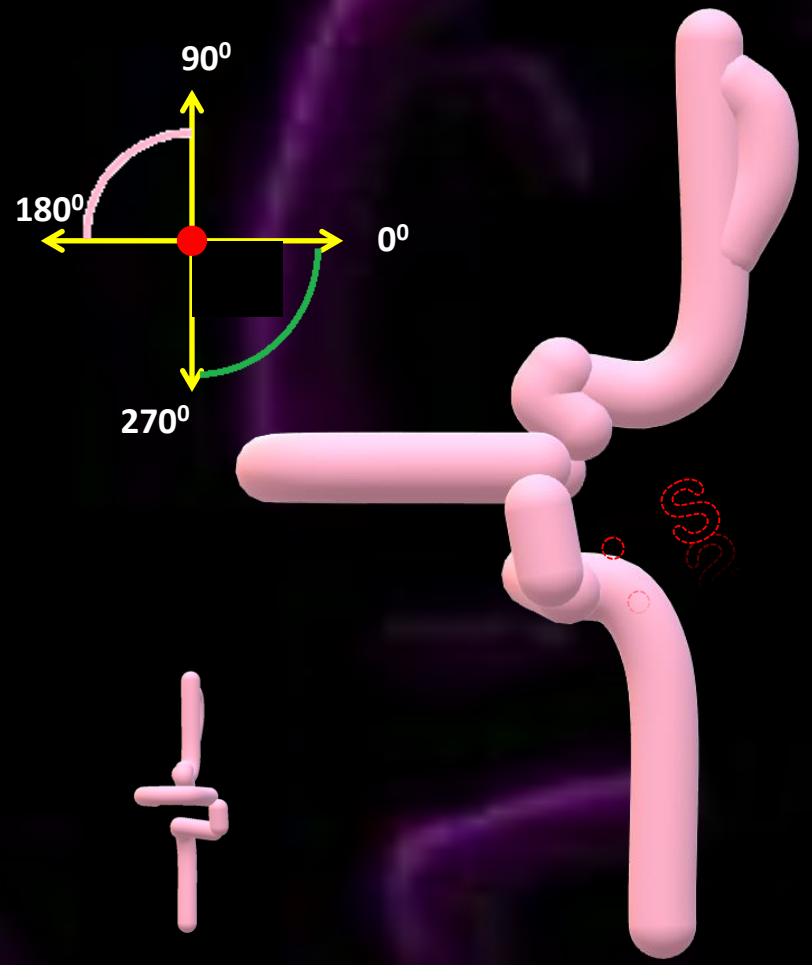
THE LYMPHOVASCULAR ANATOMY



INTESTINAL ROTATION

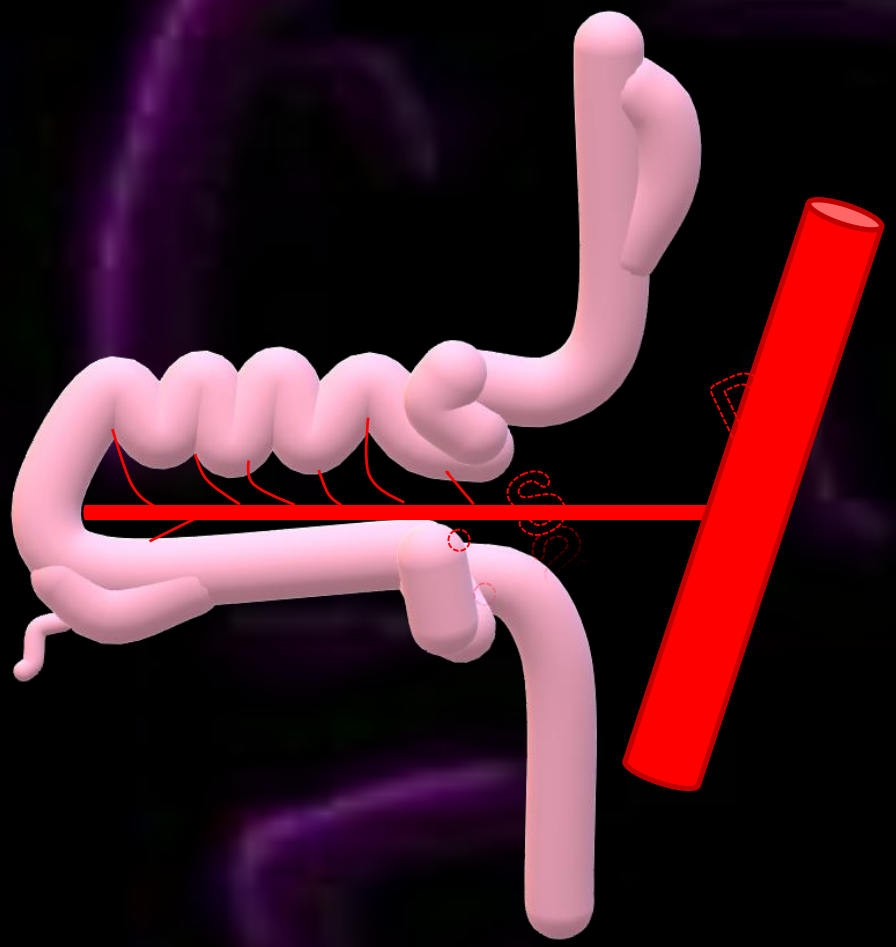


- STAGE I
- 5 TO 10 WEEKS
- Period of physiologic bowel herniation into the base of the umbilical cord.
- The Duodenojejunal (DJ)loop starts at the 90^0 position.
- The Caecocolic (CC) loop is at the 270^0 position.



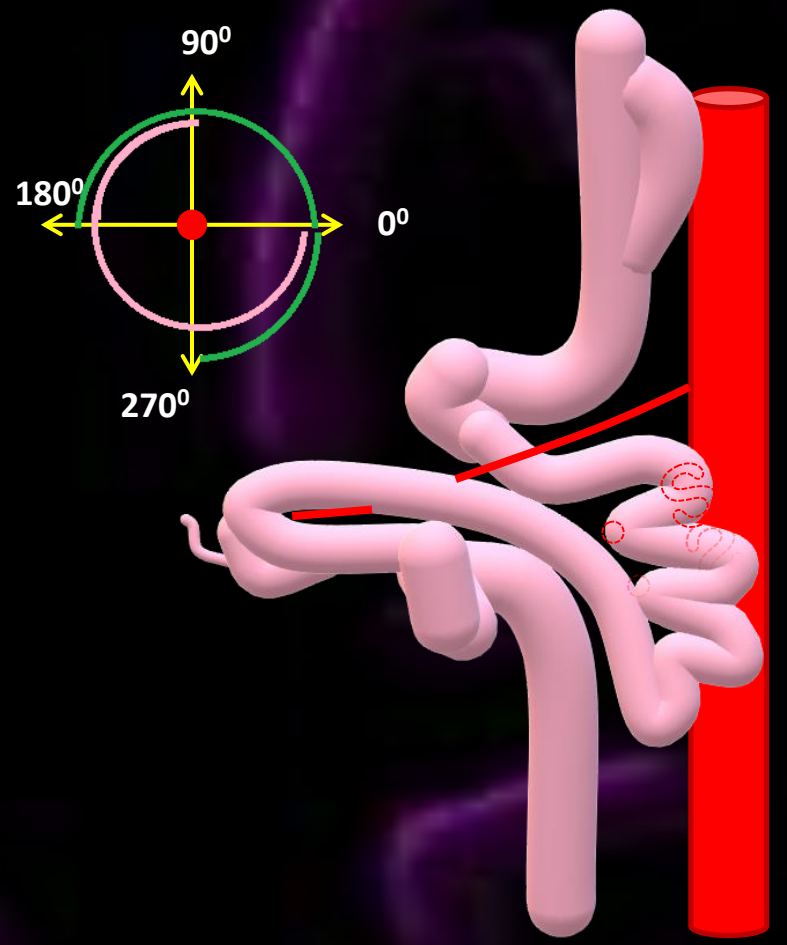
- Both loops rotate 90^0 in a counterclockwise direction.
- The DJ loop rotates to the 180^0 position and
- The CC loop to the 0^0 position

INTESTINAL ROTATION



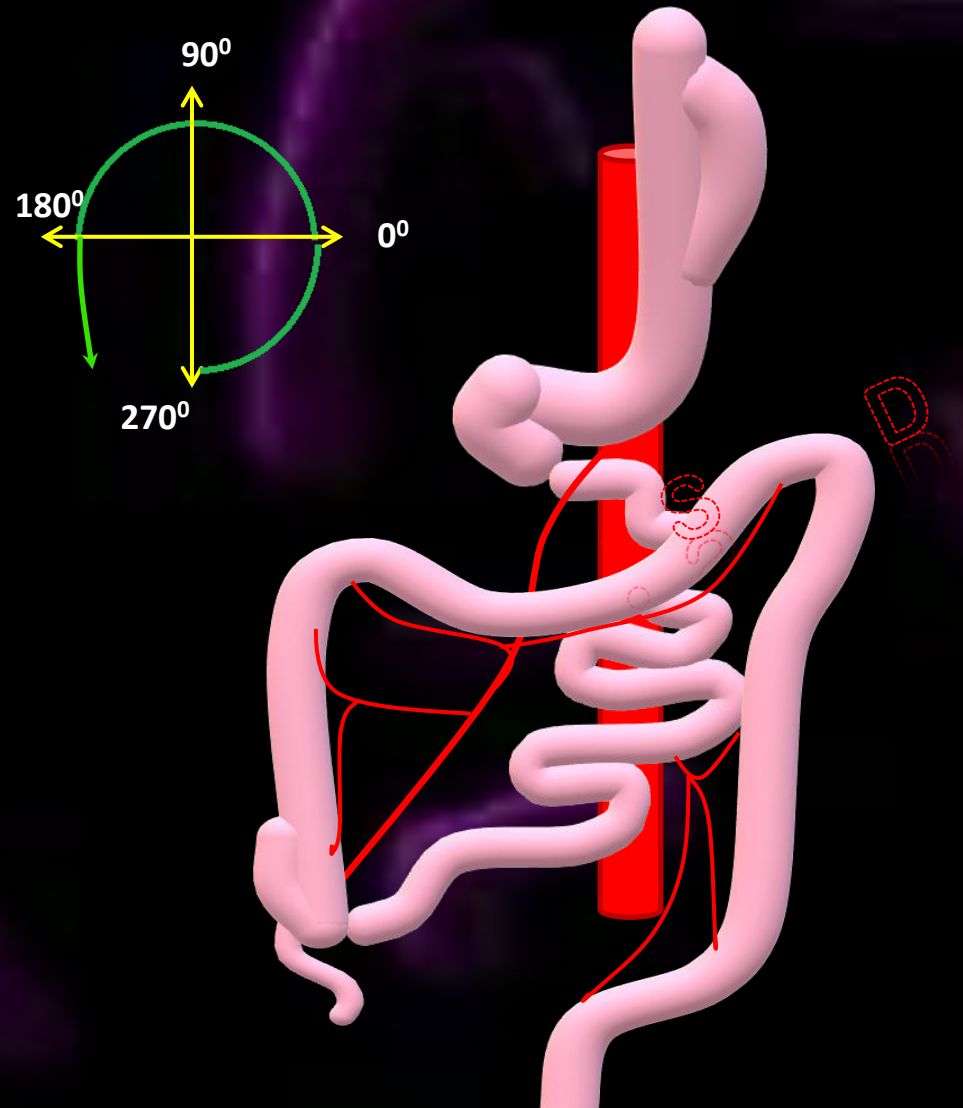
- The loops maintain this positions till the bowel returns to the coelomic cavity.
- During this period the DJ loop lengthens to form the intestine carrying its mesentery with blood supply. It also protects against development of a volvulus.
- The CC loop forms the caecal bud with the appendix.

INTESTINAL ROTATION

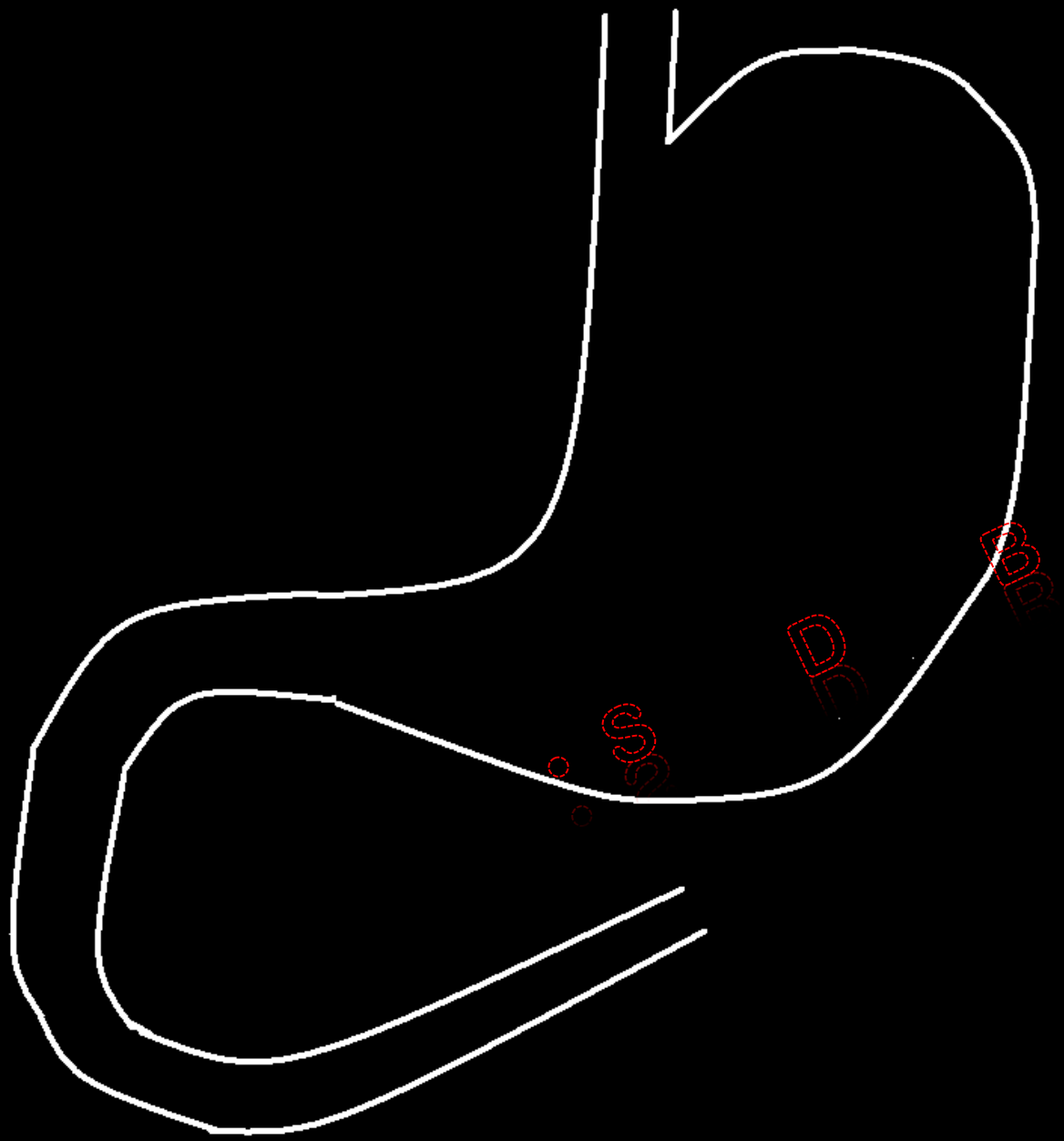


- STAGE II OCCURS AT 10 WEEKS gestation during which the bowel returns to the abdominal cavity.
- The DJ loop rotates an additional 180° to end at the anatomical left of the SMA, the 0° position.
- The CC loop turns 180° more as it re-enters the abdominal cavity. This turn places it to the anatomical right of the SMA, At the 180° position.

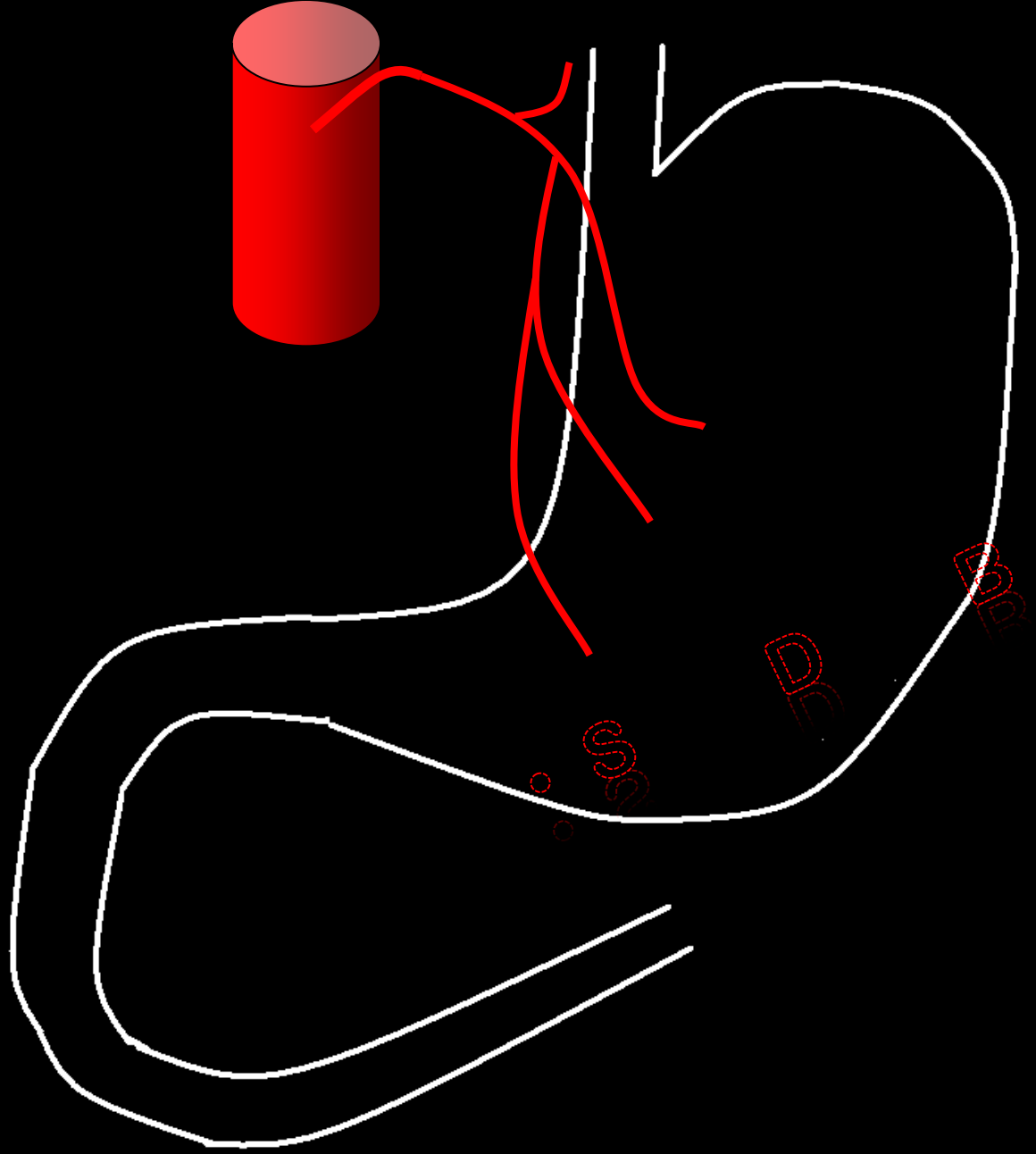
INTESTINAL ROTATION



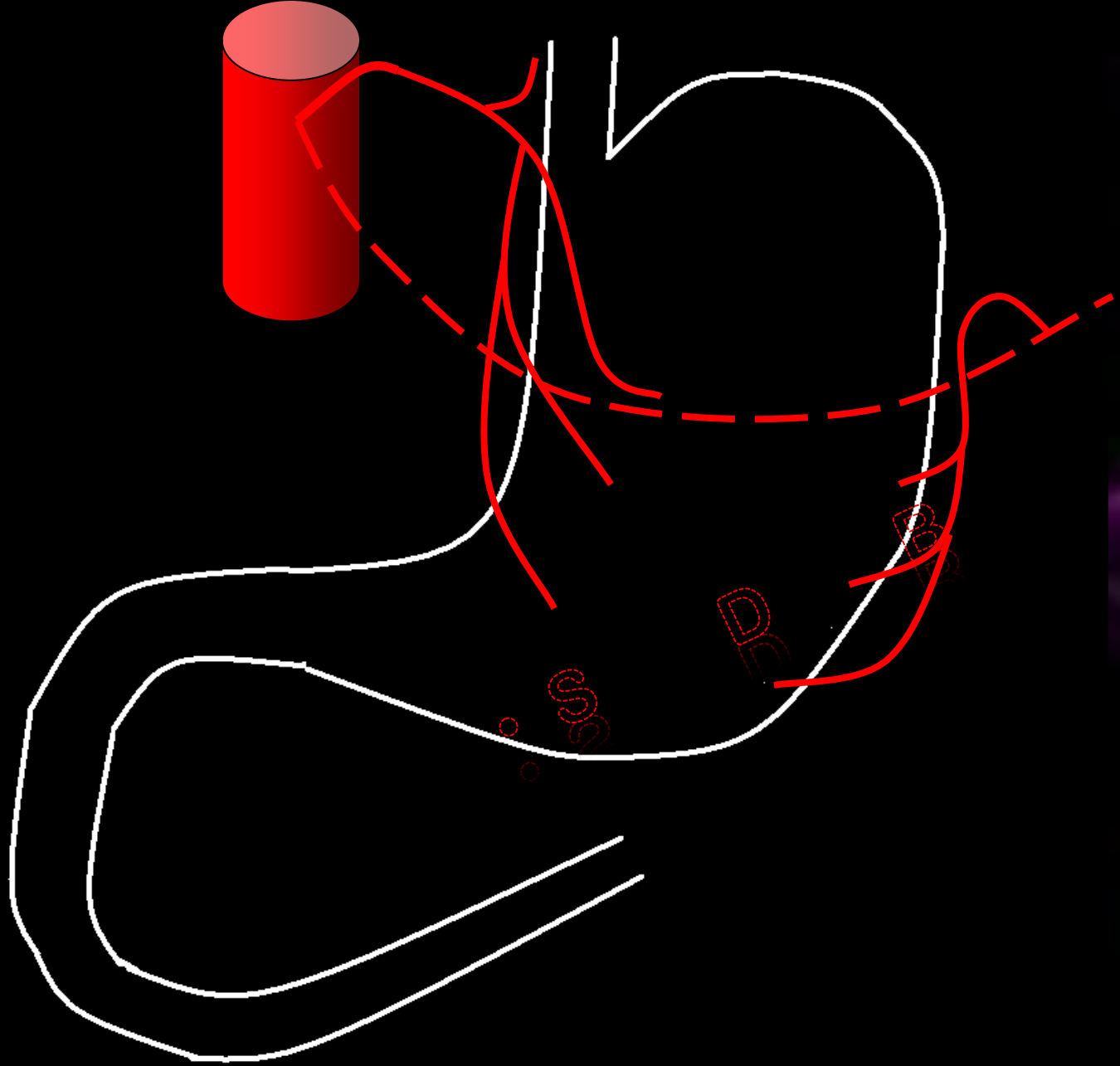
- STAGE III LASTS FROM 11 WEEKS' GESTATION UNTIL TERM.
- It involves the descent of the cecum to the right lower quadrant and fixation of the mesenteries.



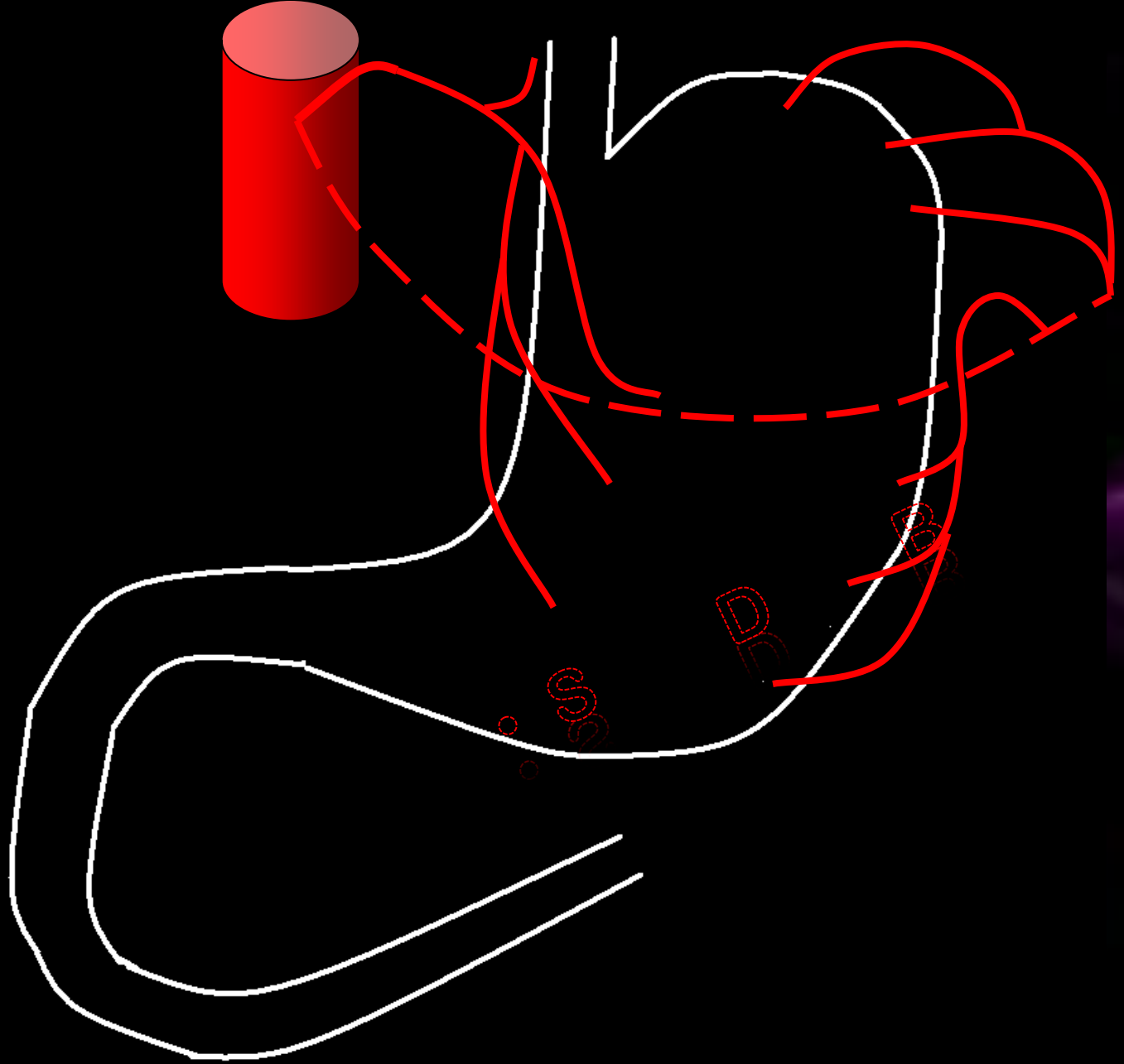
Blood supply of the stomach



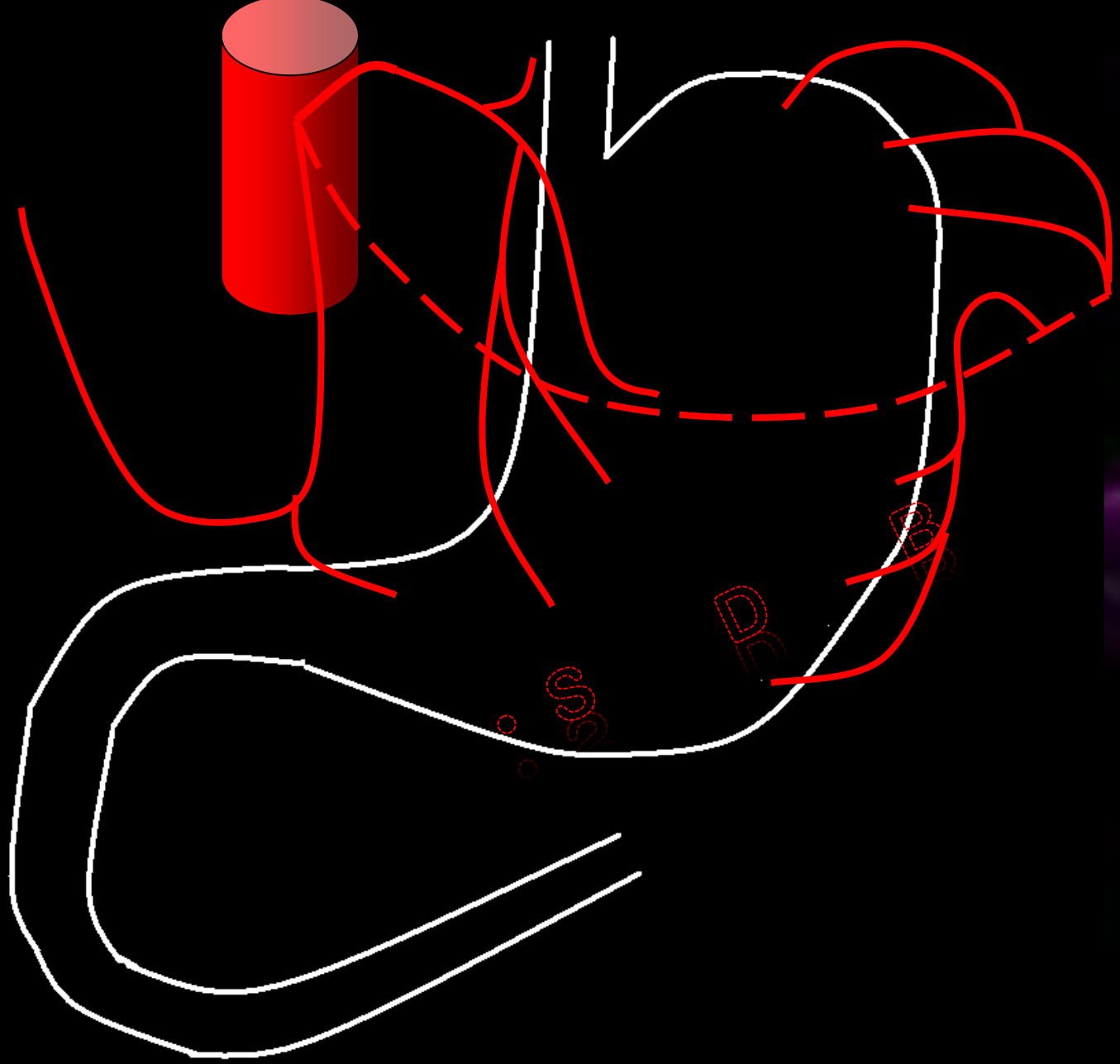
Blood supply of the stomach



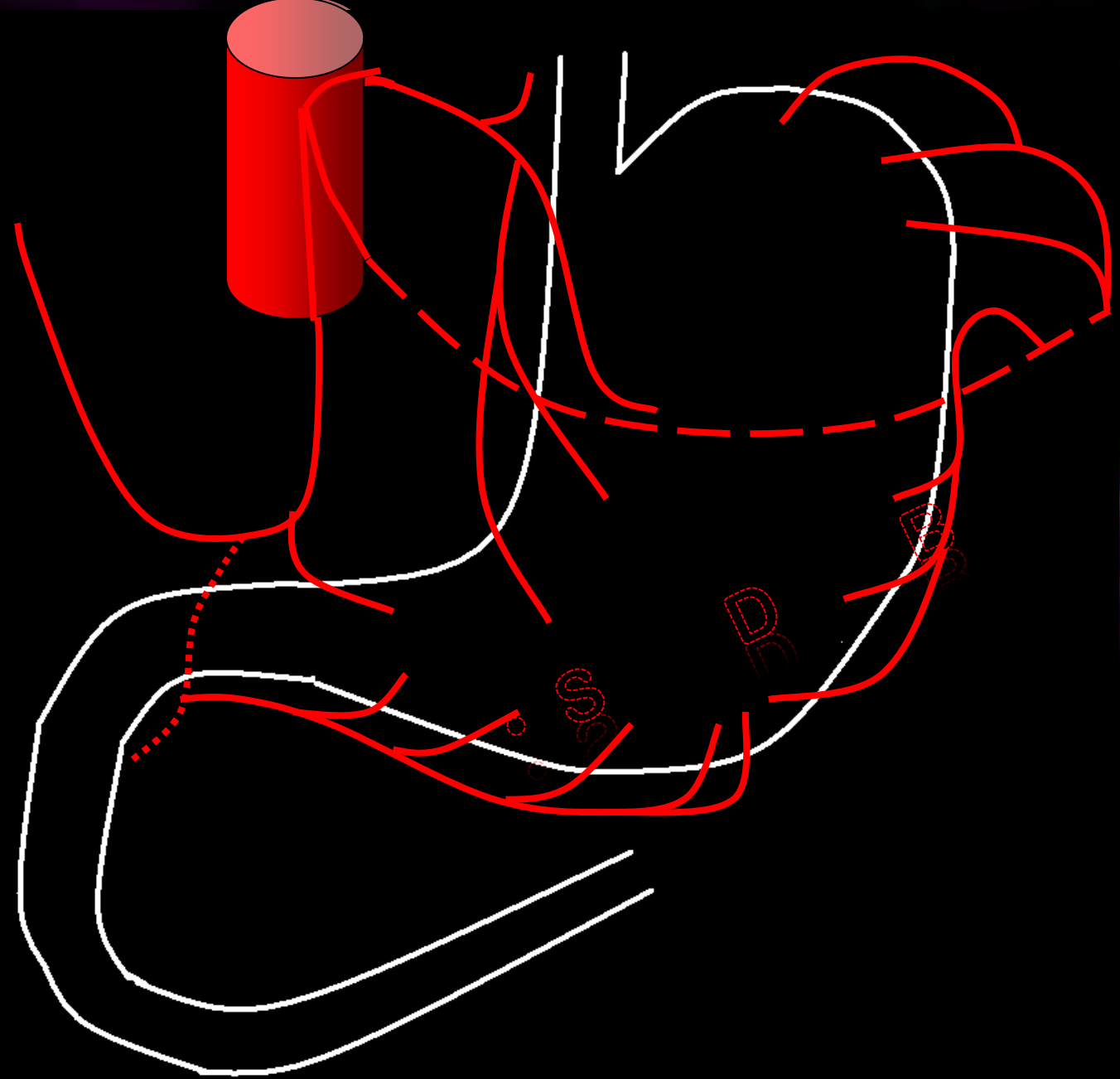
Blood supply of the stomach



Blood supply of the stomach



Blood supply of the stomach

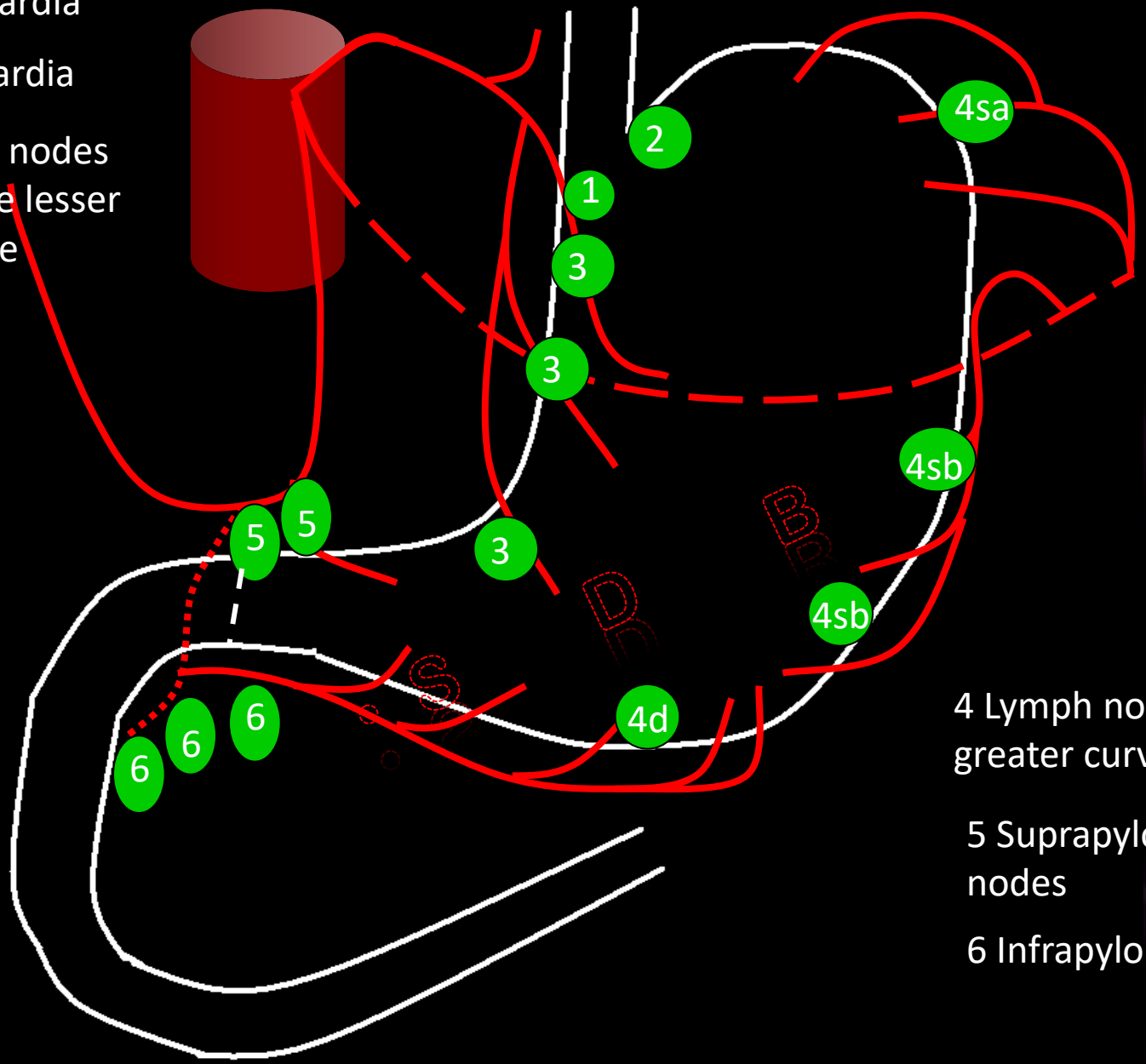


Blood supply of the stomach

1-Right cardia

2- Left cardia

3 Lymph nodes along the lesser curvature



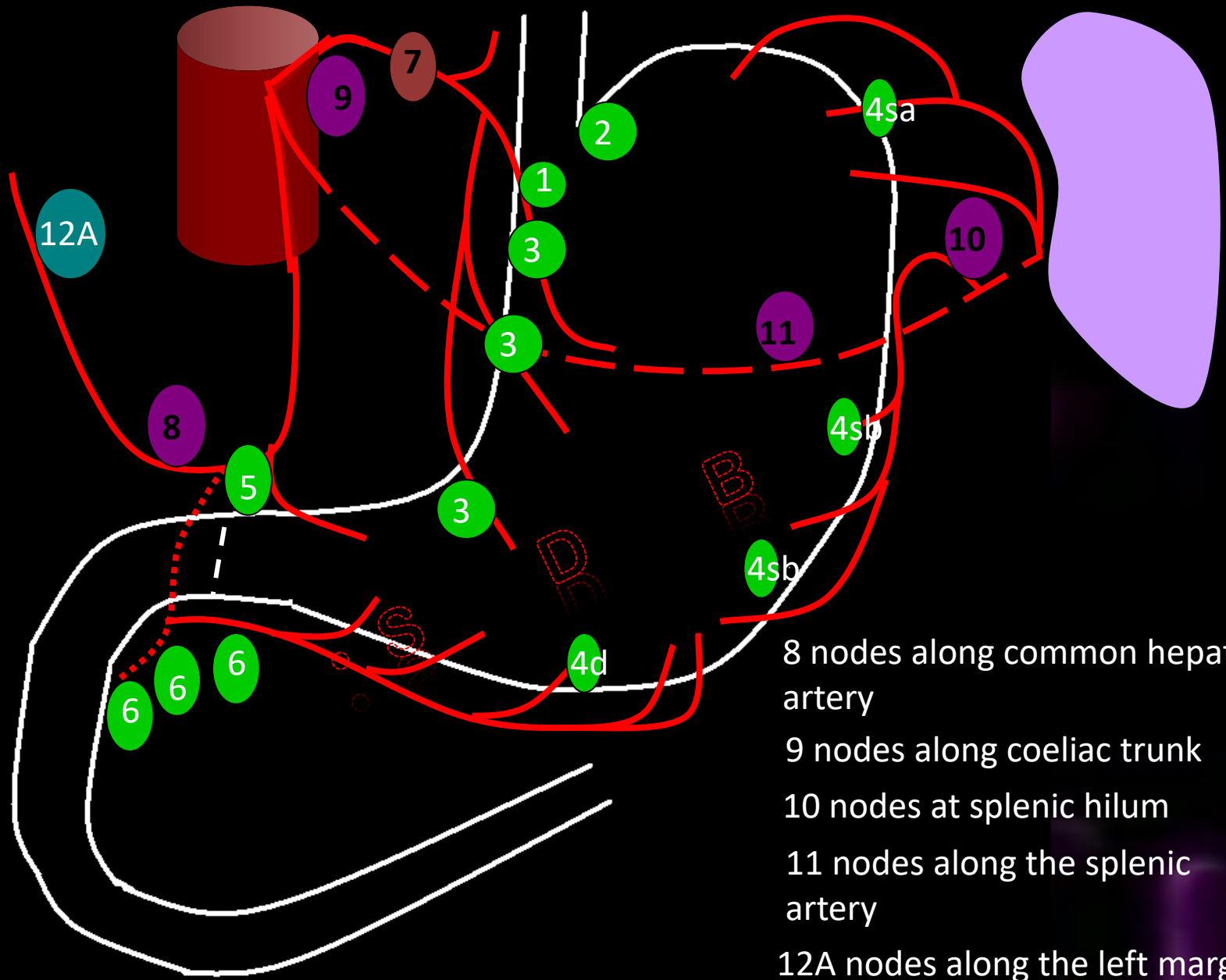
4 Lymph nodes along the greater curvature

5 Suprapyloric lymph nodes

6 Infrapyloric lymph nodes

D1 DISSECTION; N1 LEVEL

7 nodes along left gastric



D2 DISSECTION; N2 LEVEL

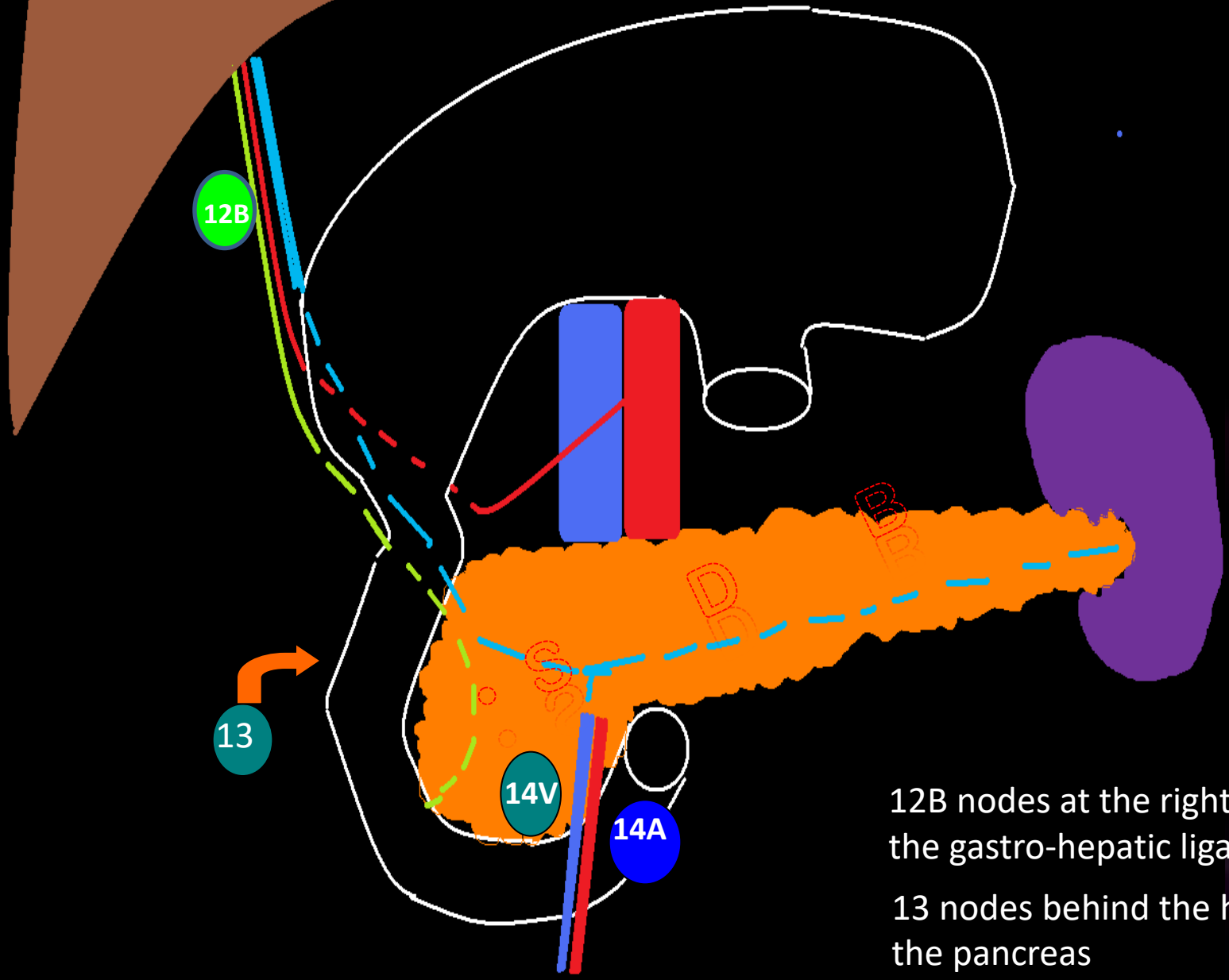
8 nodes along common hepatic artery

9 nodes along coeliac trunk

10 nodes at splenic hilum

11 nodes along the splenic artery

12A nodes along the left margin of the gastro-hepatic ligament

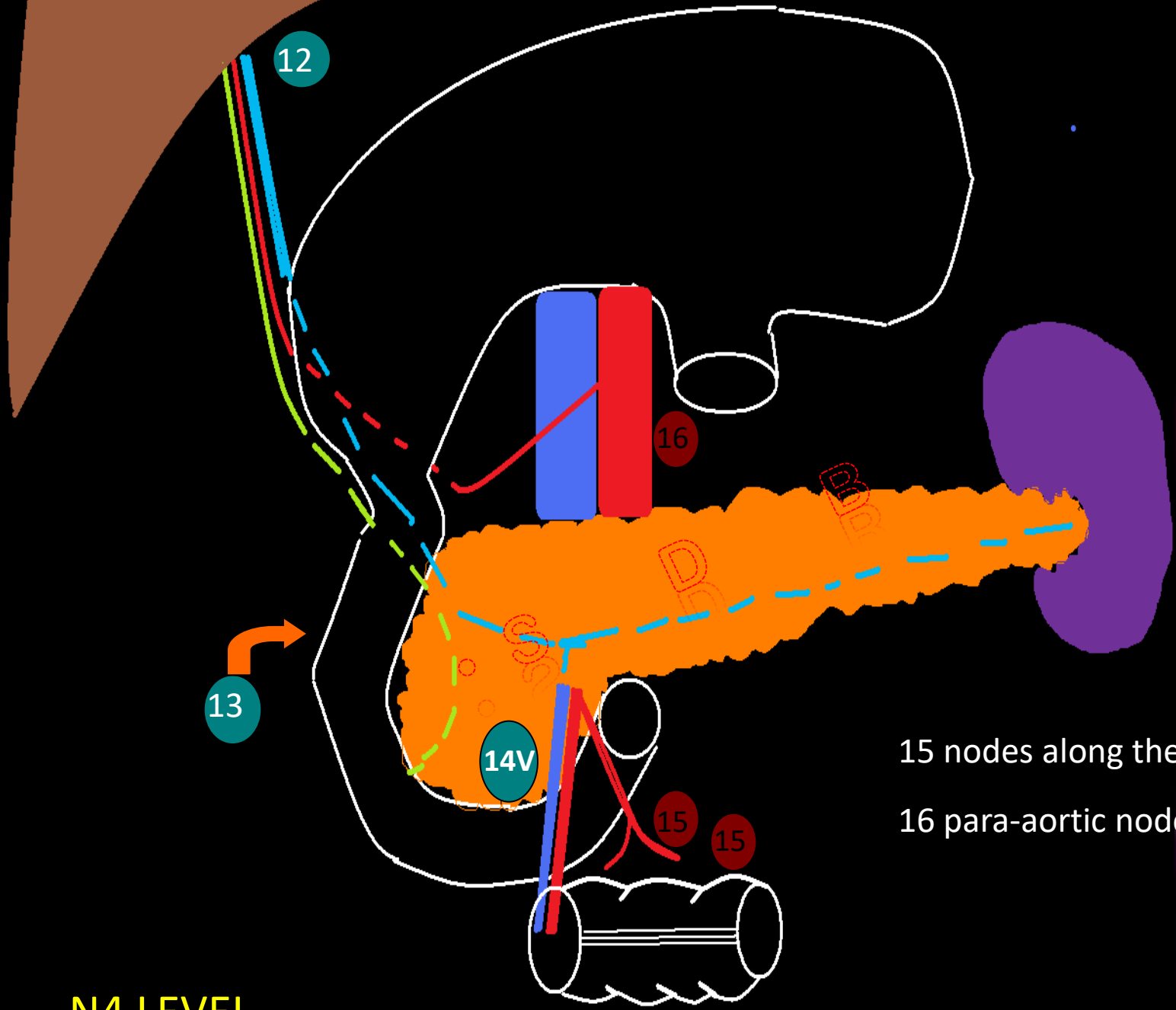


D3 DISSECTION; N3 LEVEL

12B nodes at the right side of the gastro-hepatic ligament

13 nodes behind the head of the pancreas

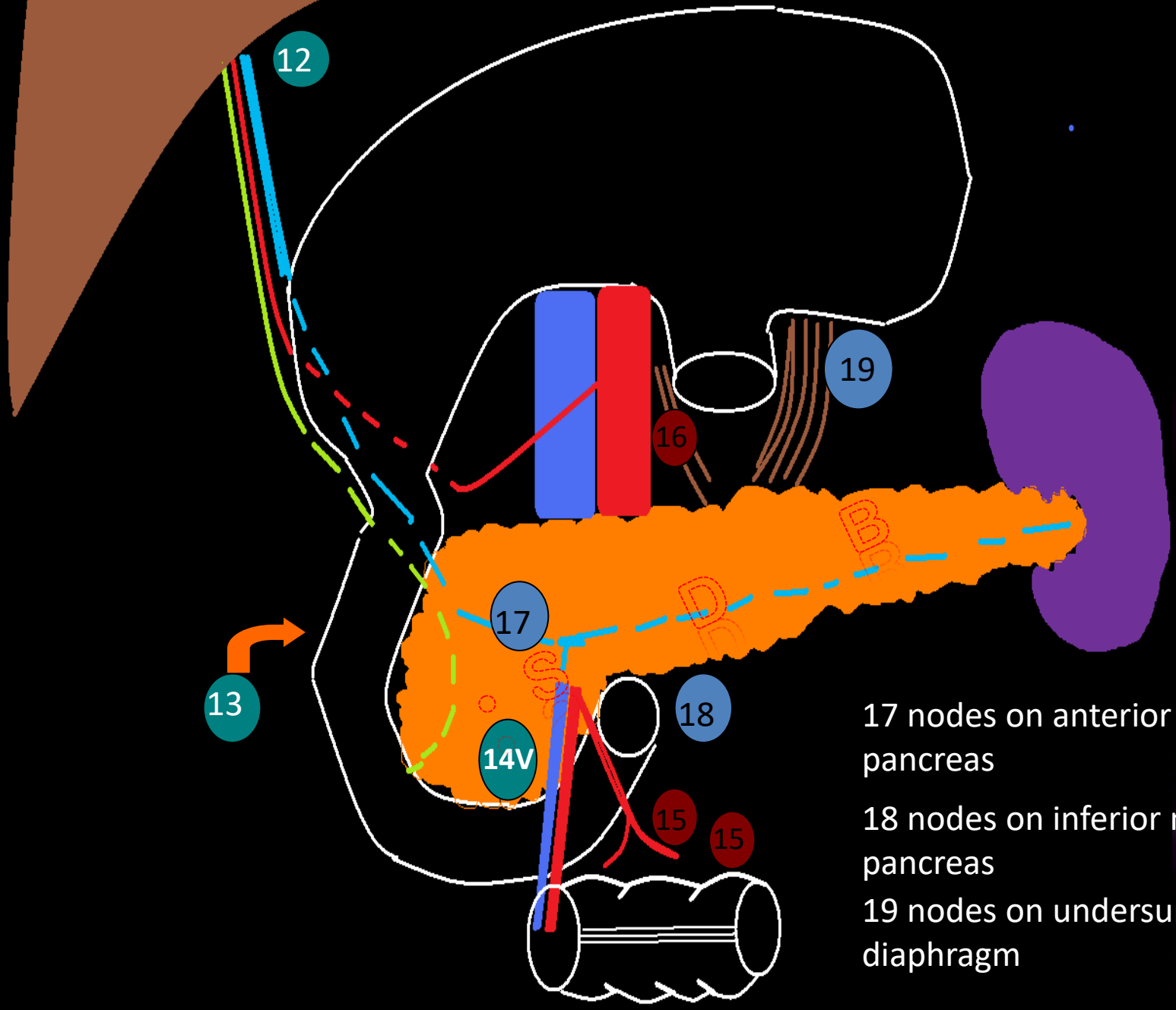
14 nodes along the root of the mesentery



15 nodes along the middle colic

16 para-aortic nodes ?

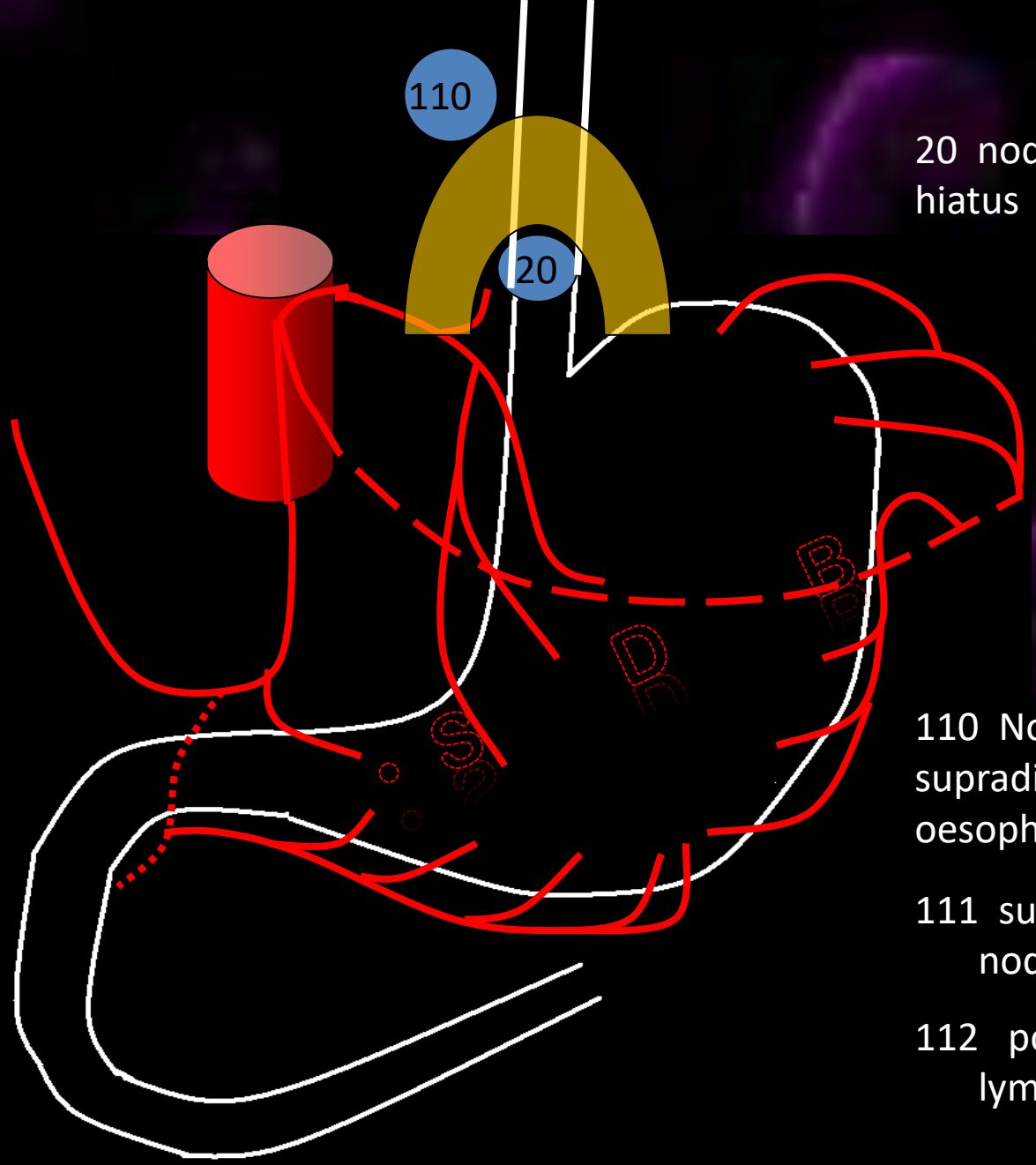
N4 LEVEL



17 nodes on anterior surface of pancreas

18 nodes on inferior margin of pancreas

19 nodes on undersurface of diaphragm



20 nodes at the oesophageal hiatus

110 Nodes along the supradiaphragmatic oesophagus

111 supra-diaphragmatic lymph nodes

112 posterior mediastinal lymph nodes

STEPS OF SURGERY FOR GASTRIC CANCER

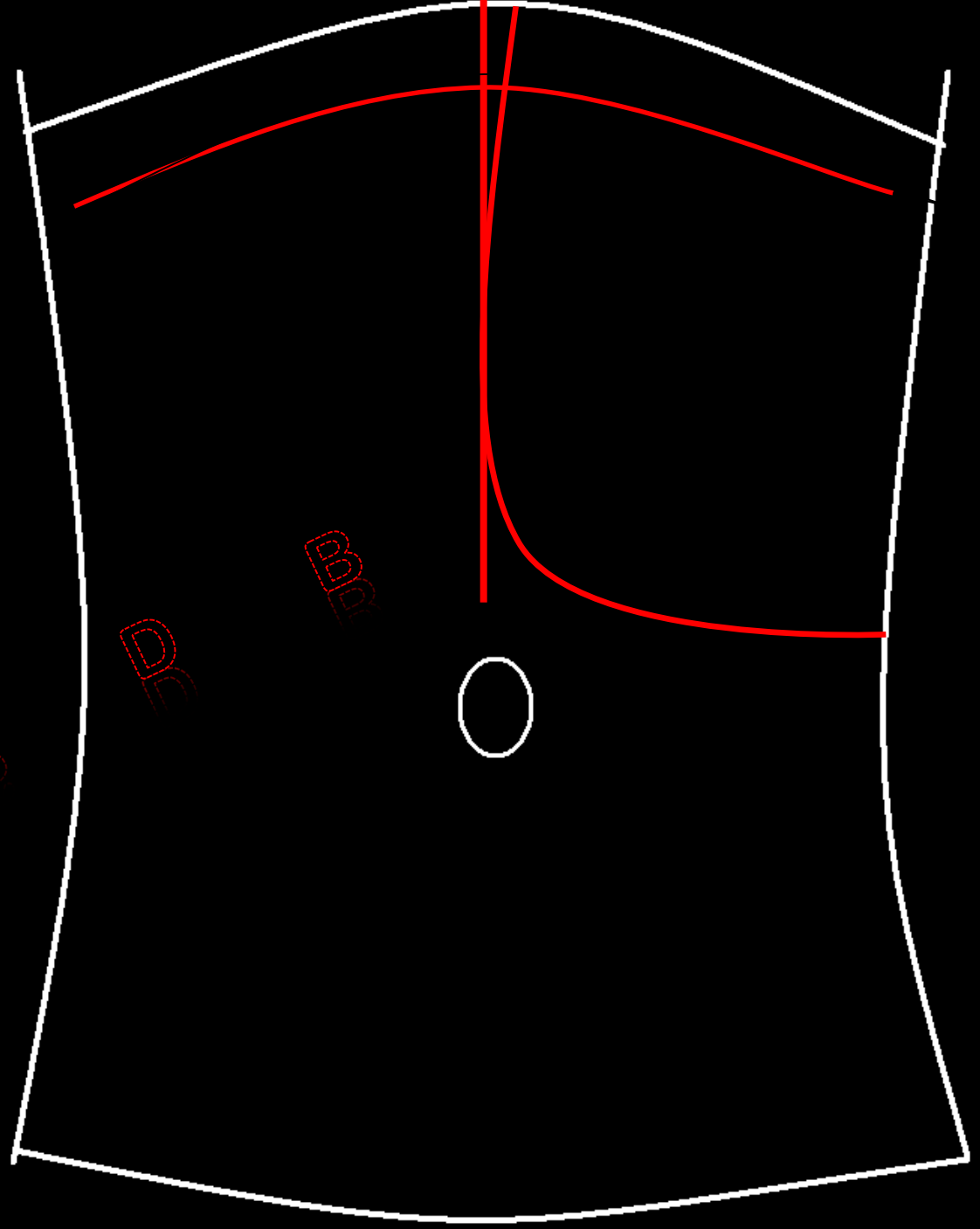
Dr Sanjay De Bakshi
MS(Cal); FRCS(Eng); FRCS (Edin-ad eundem)
Director; Calcutta Chirurgiae Collective
Visiting Consultant
- CMRI C K Birla Hospitals
- Woodlands Multispecialty hospital

With special thanks to:-
Dr Manas Roy;
MS, FRCS (Edin), MCh
Ex-Surgical Director
Tata Cancer Hospital

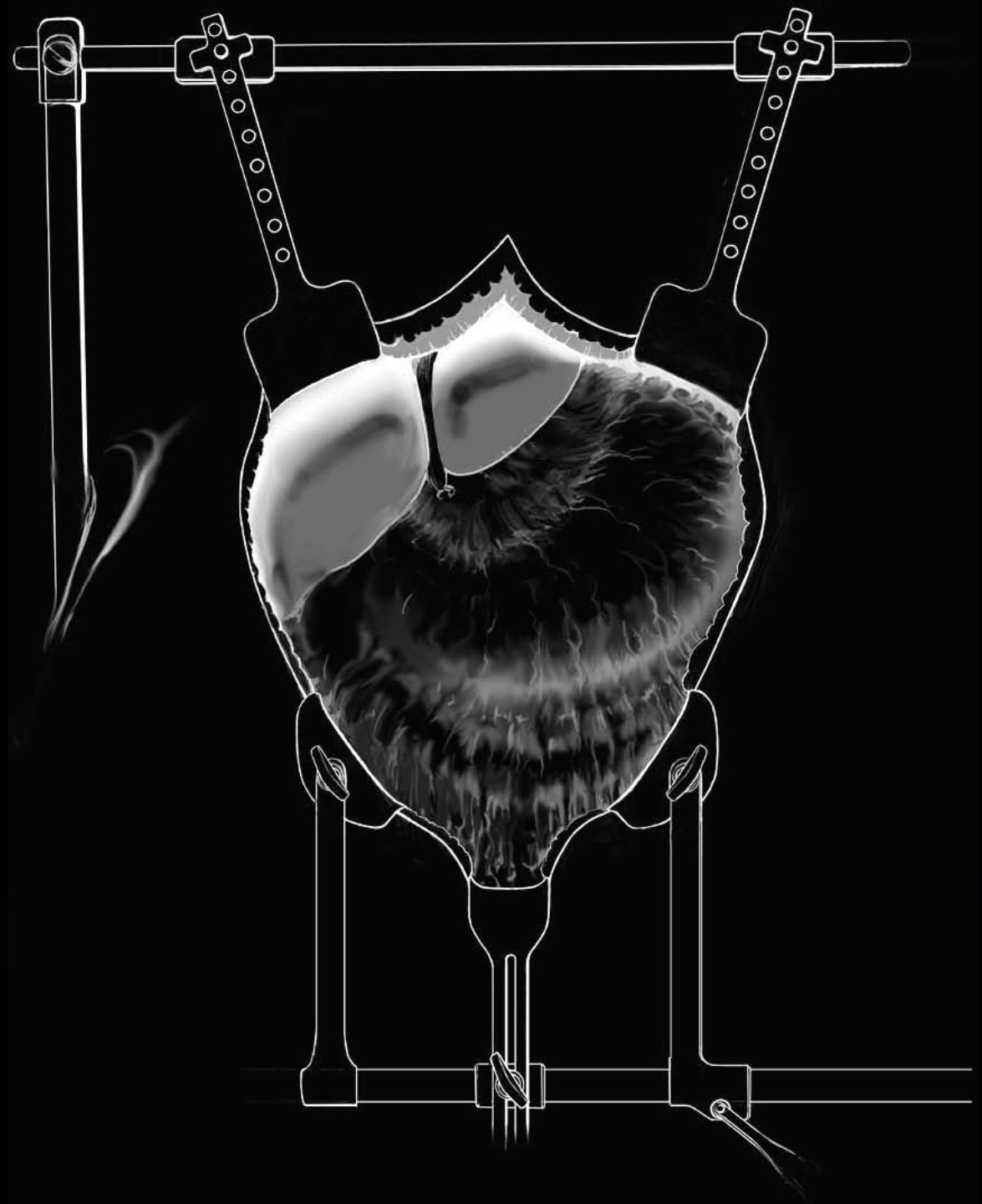
INCISION

EXPLORATORY LAPAROSCOPY & LAPAROTOMY

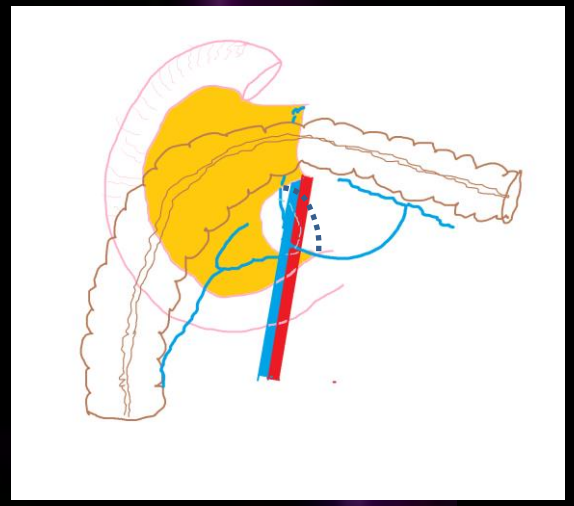
- Liver metastases
- Ascites
- Peritoneal carcinomatosis
- Tumor localization and size
- Lymph node enlargement
- Penetration into pancreas, spleen, and transverse colon



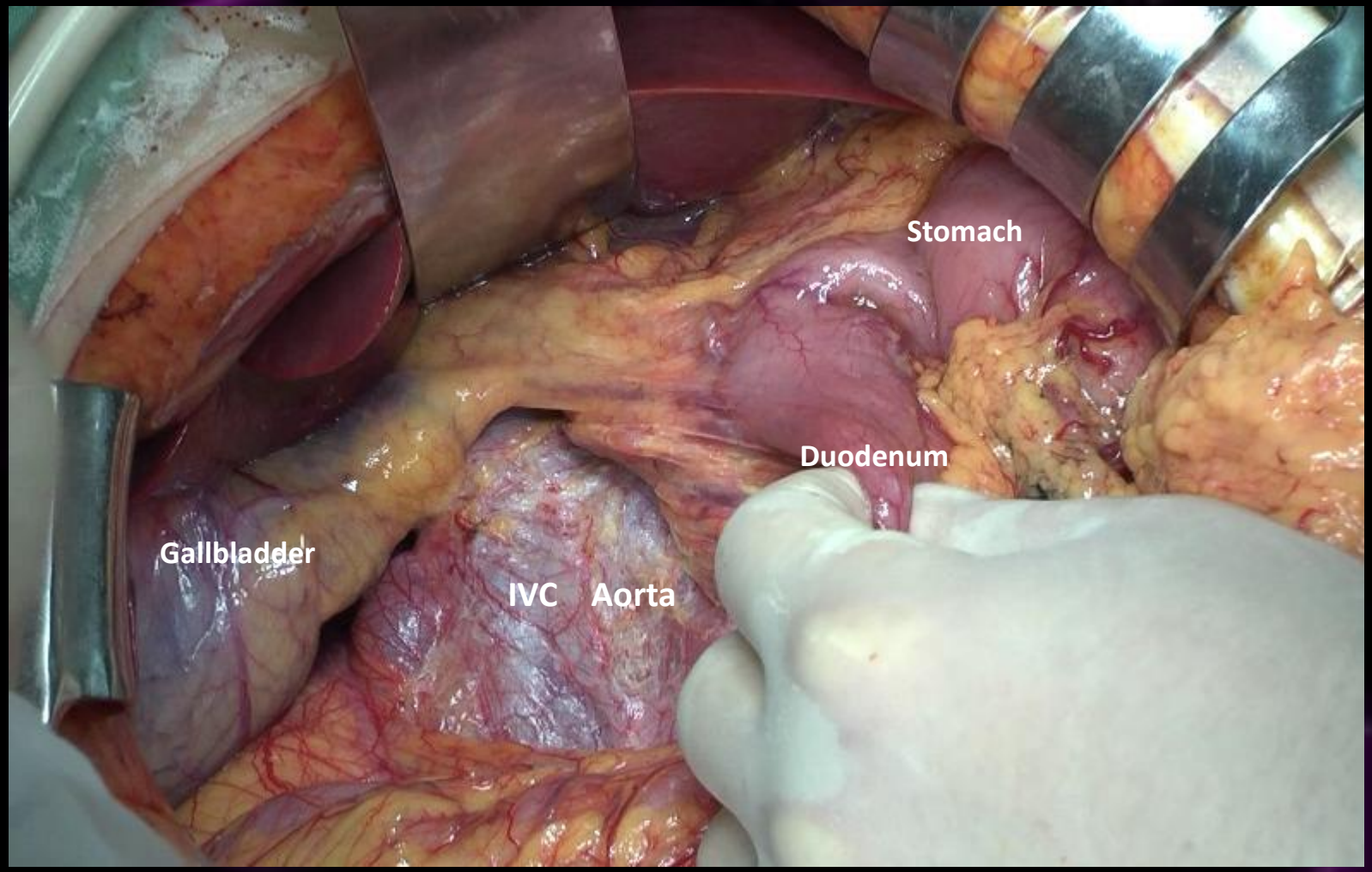
RETRACTION



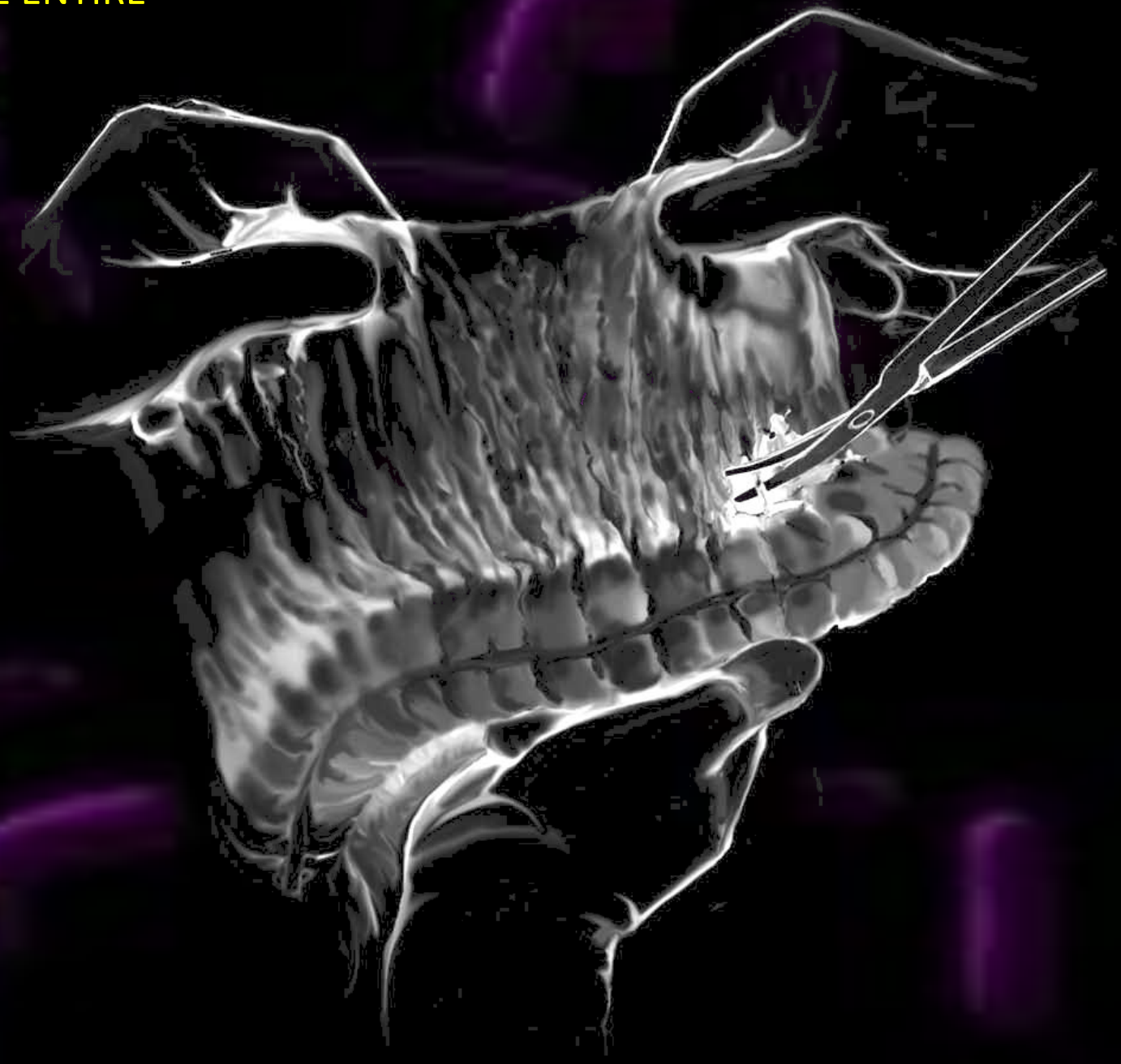
KOCHERISATION



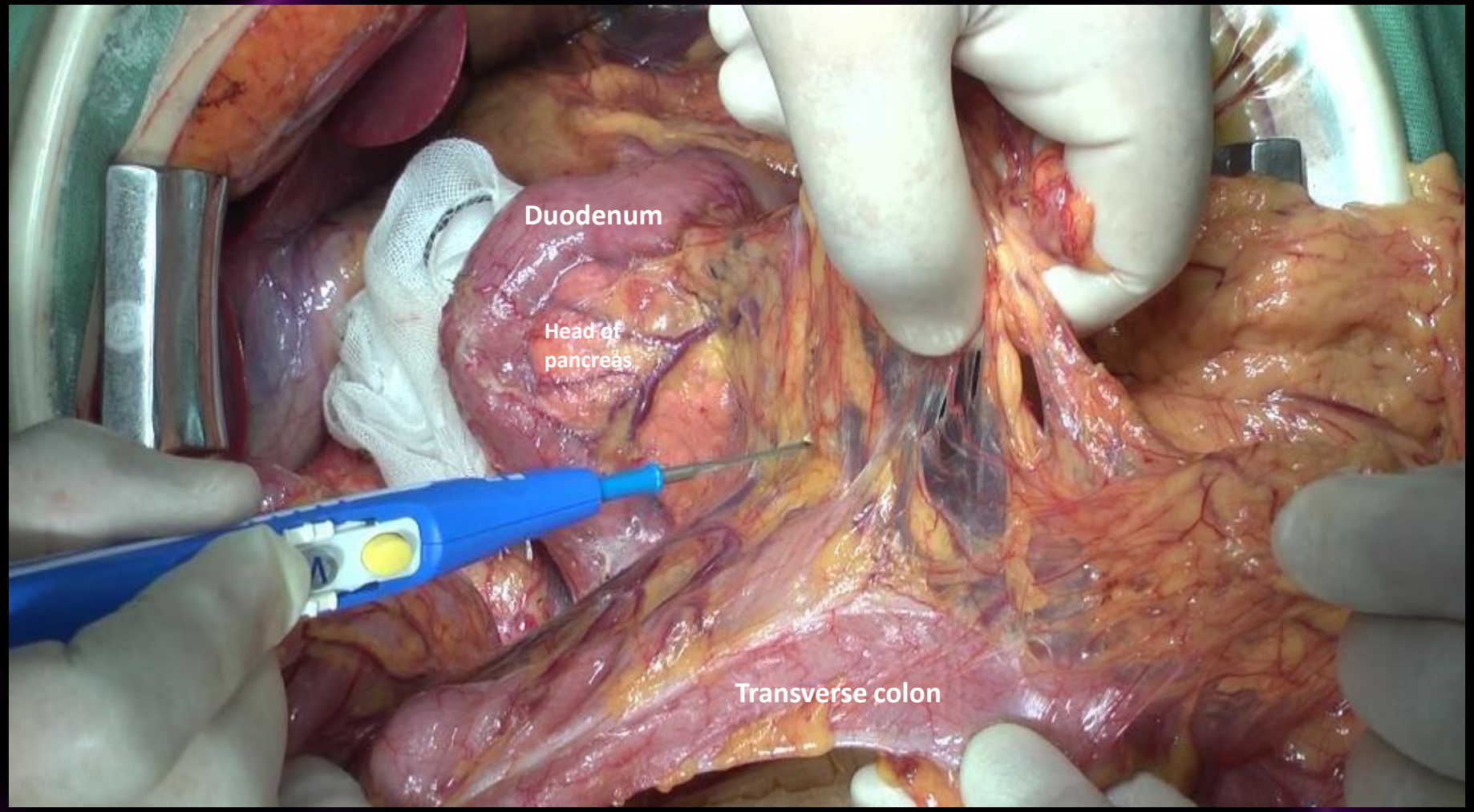
Kocherization



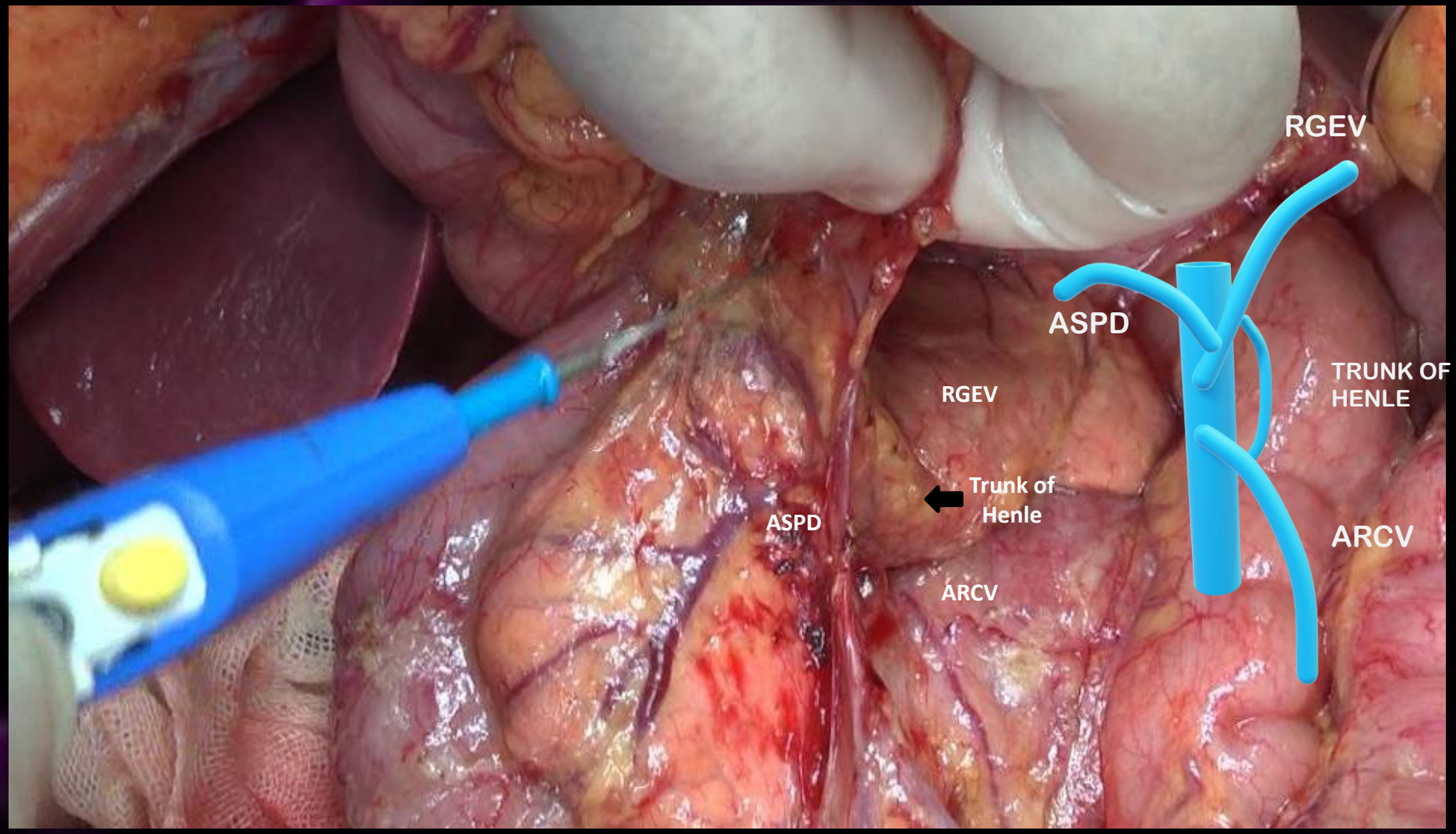
SEPARATION OF THE GREATER OMENTUM FROM THE ENTIRE TRANSVERSE COLON



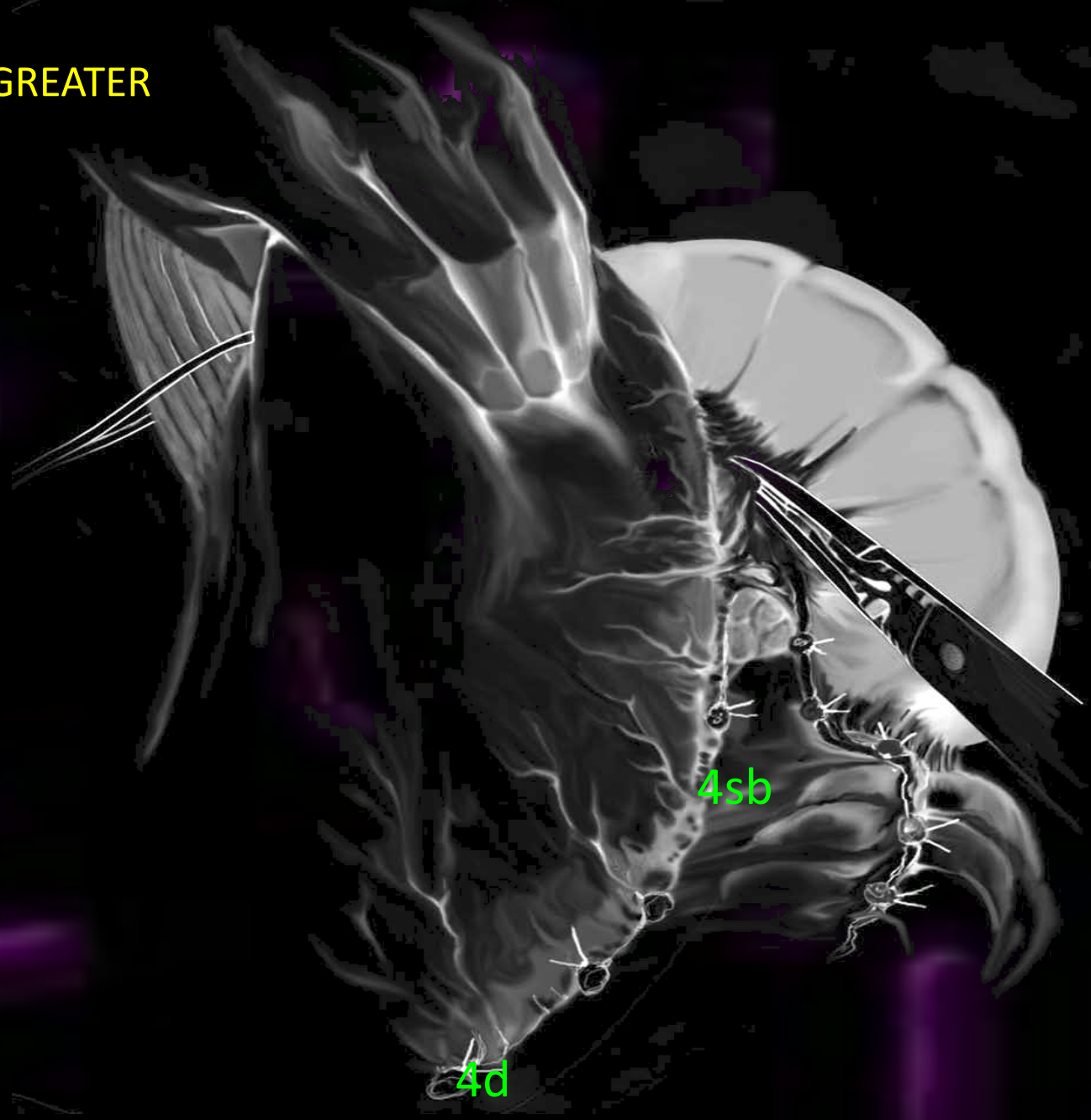
Dissection of omentum



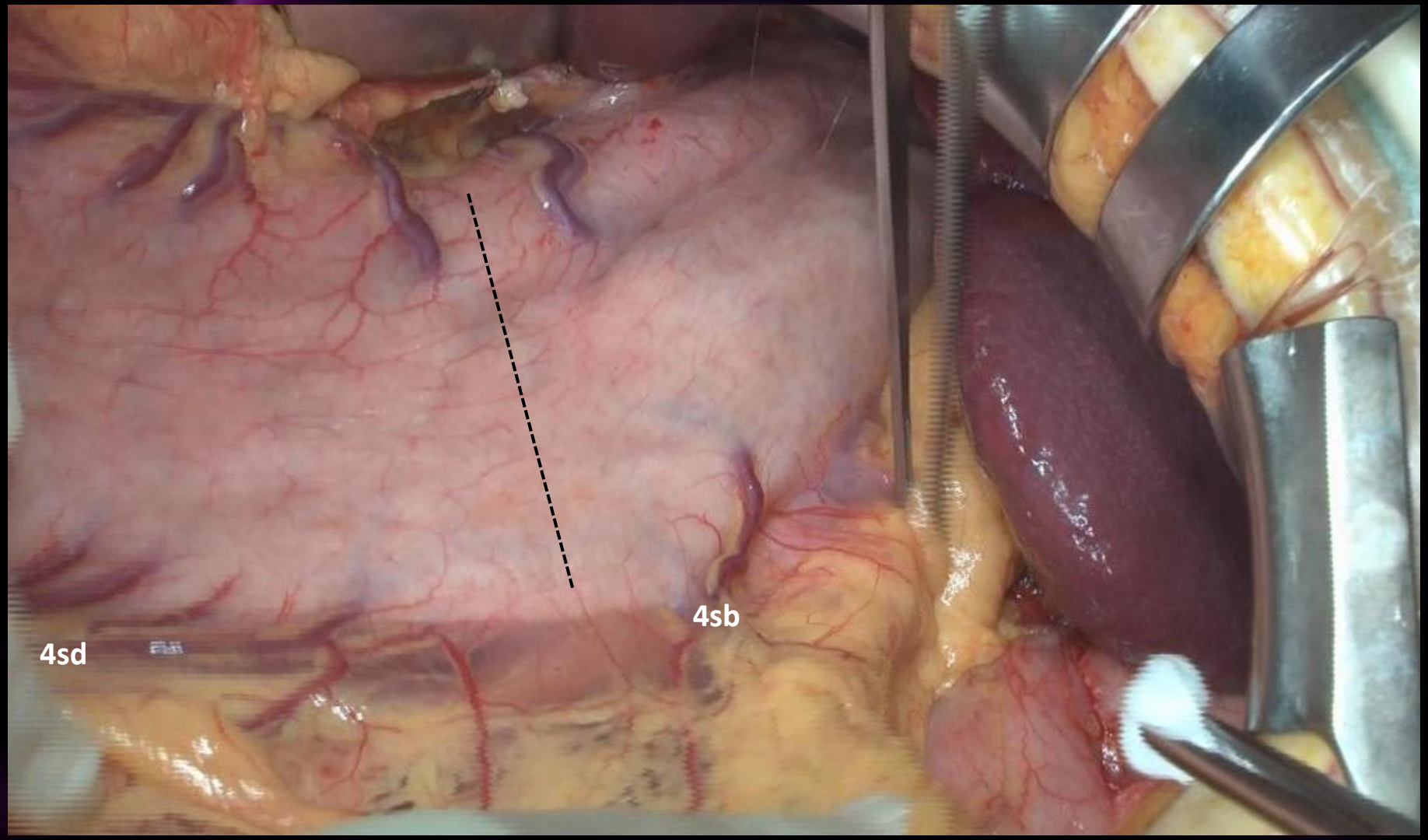
Division of the right gastro-epiploic vein



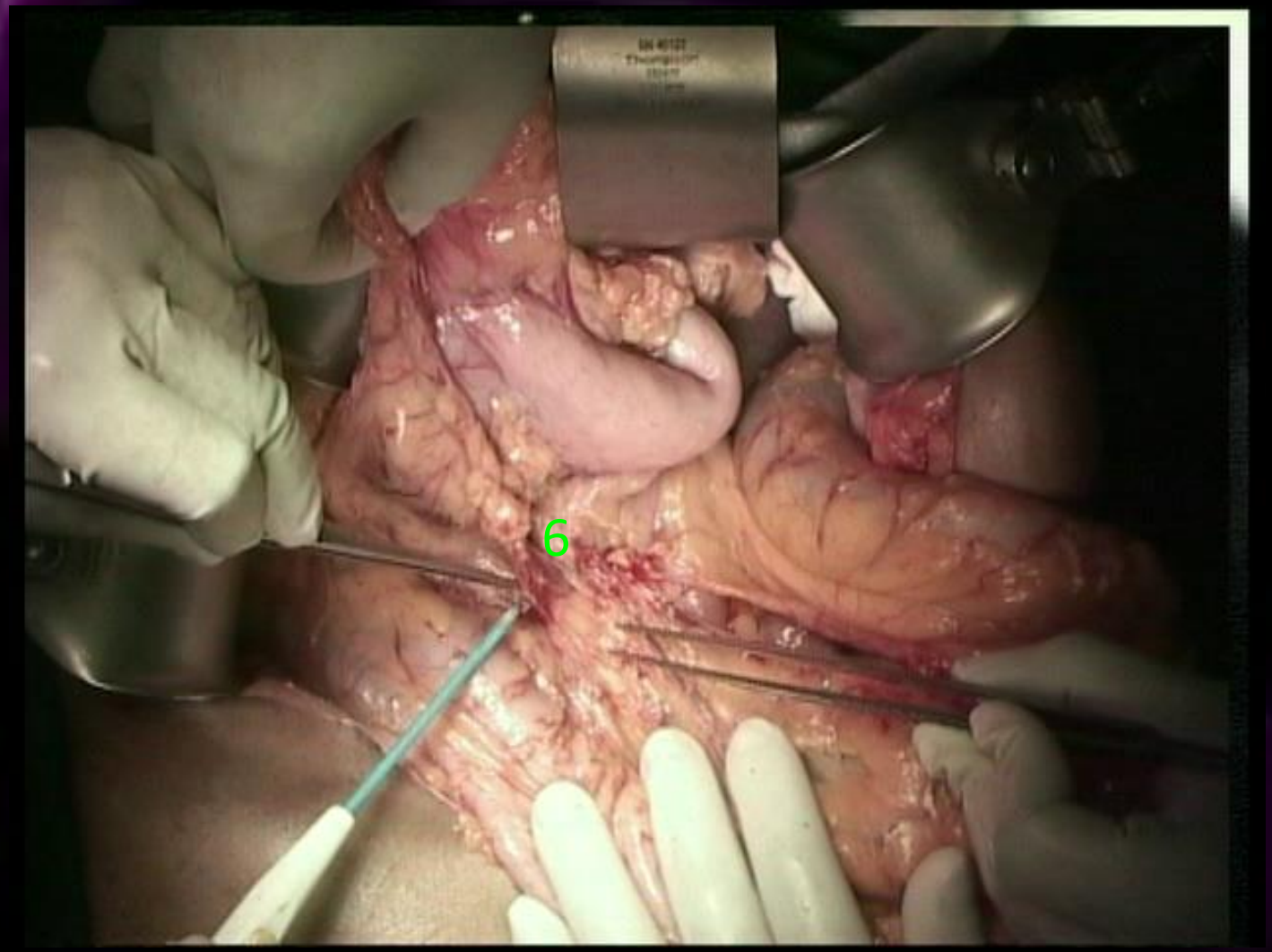
MOBILIZATION OF THE GREATER CURVATURE



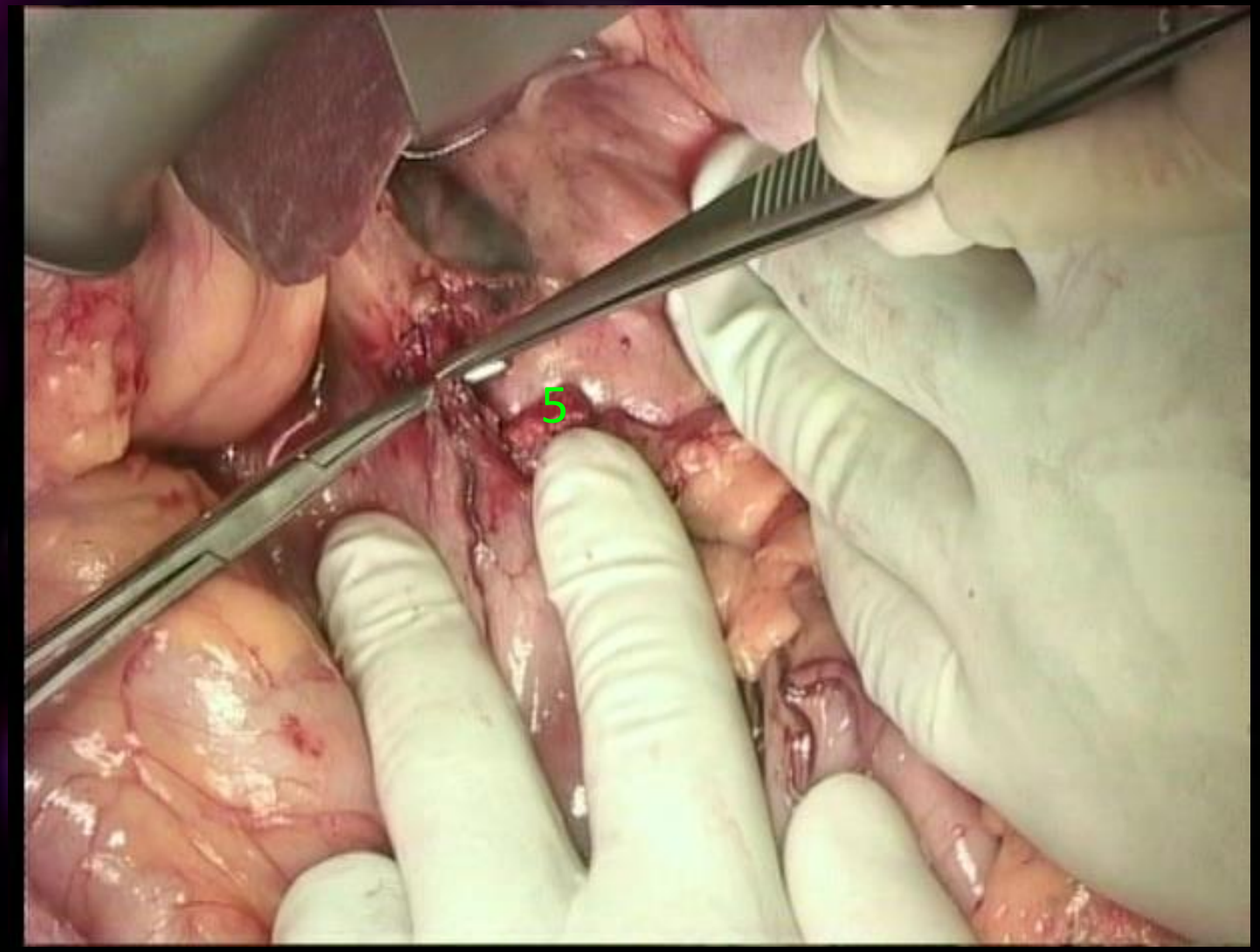
Greater curvature

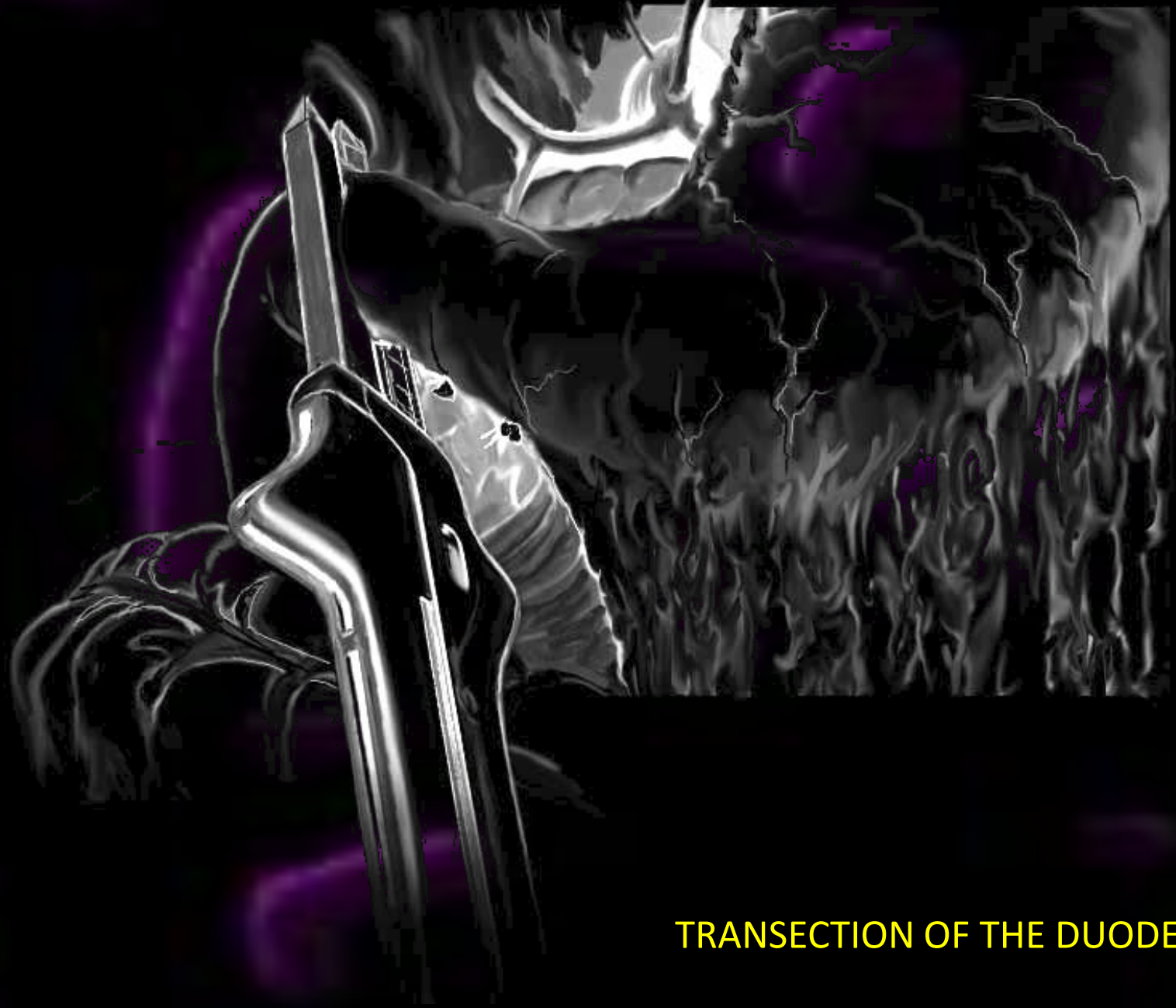


Dissecting along the right Gastro-epiploic



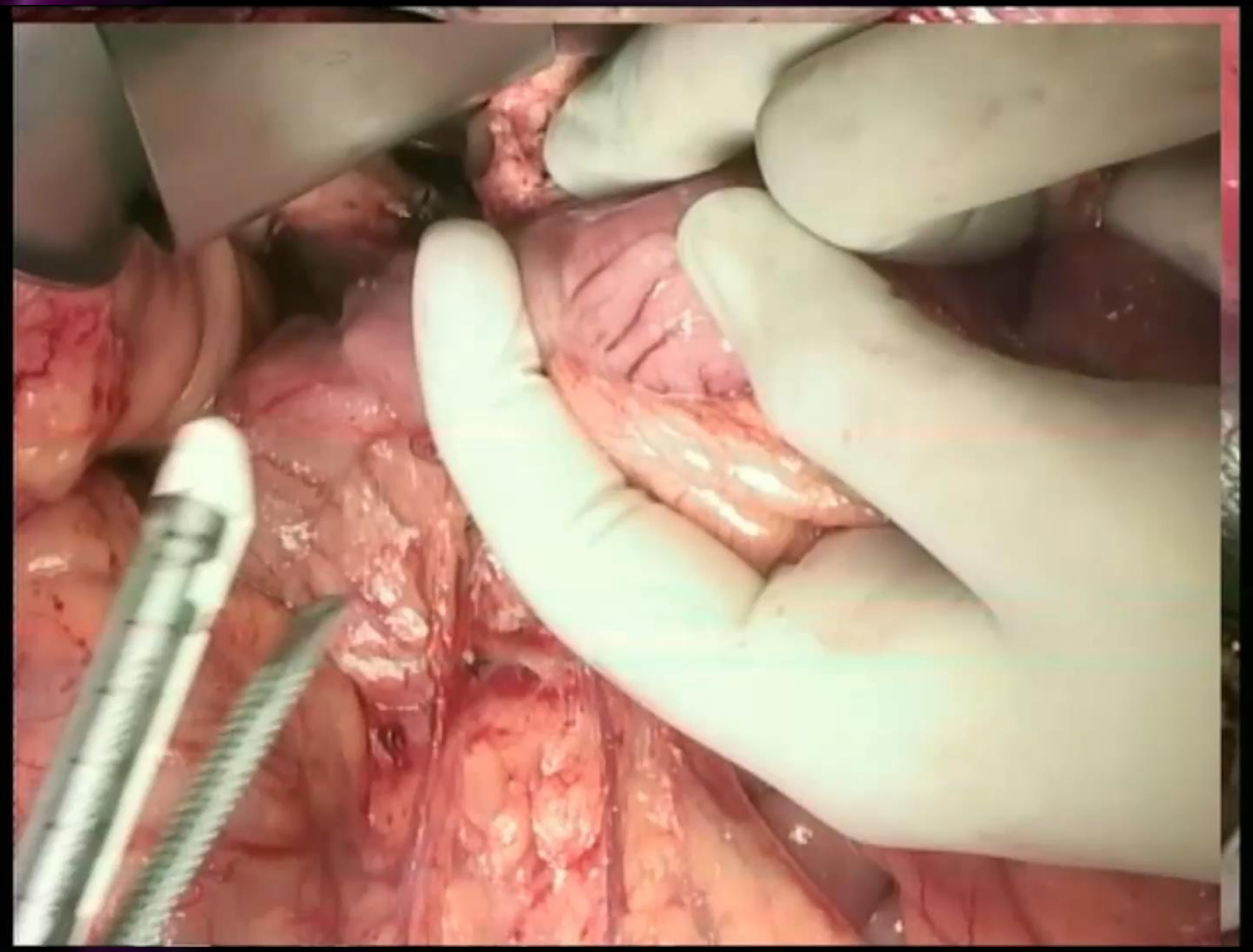
Dissecting along the Right Gastric Artery





TRANSECTION OF THE DUODENUM

Duodenal transection

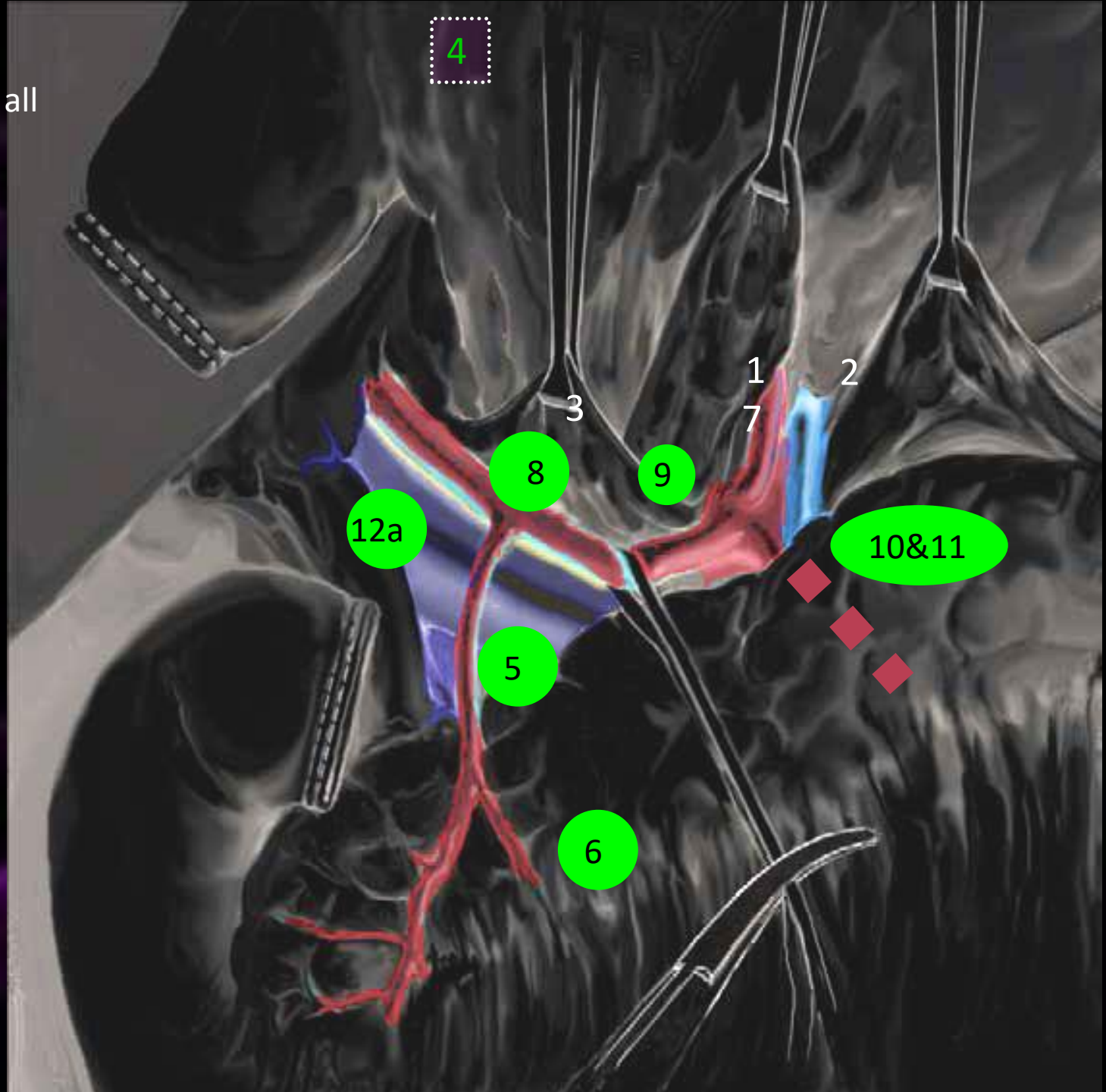


D2 GASTRECTOMY

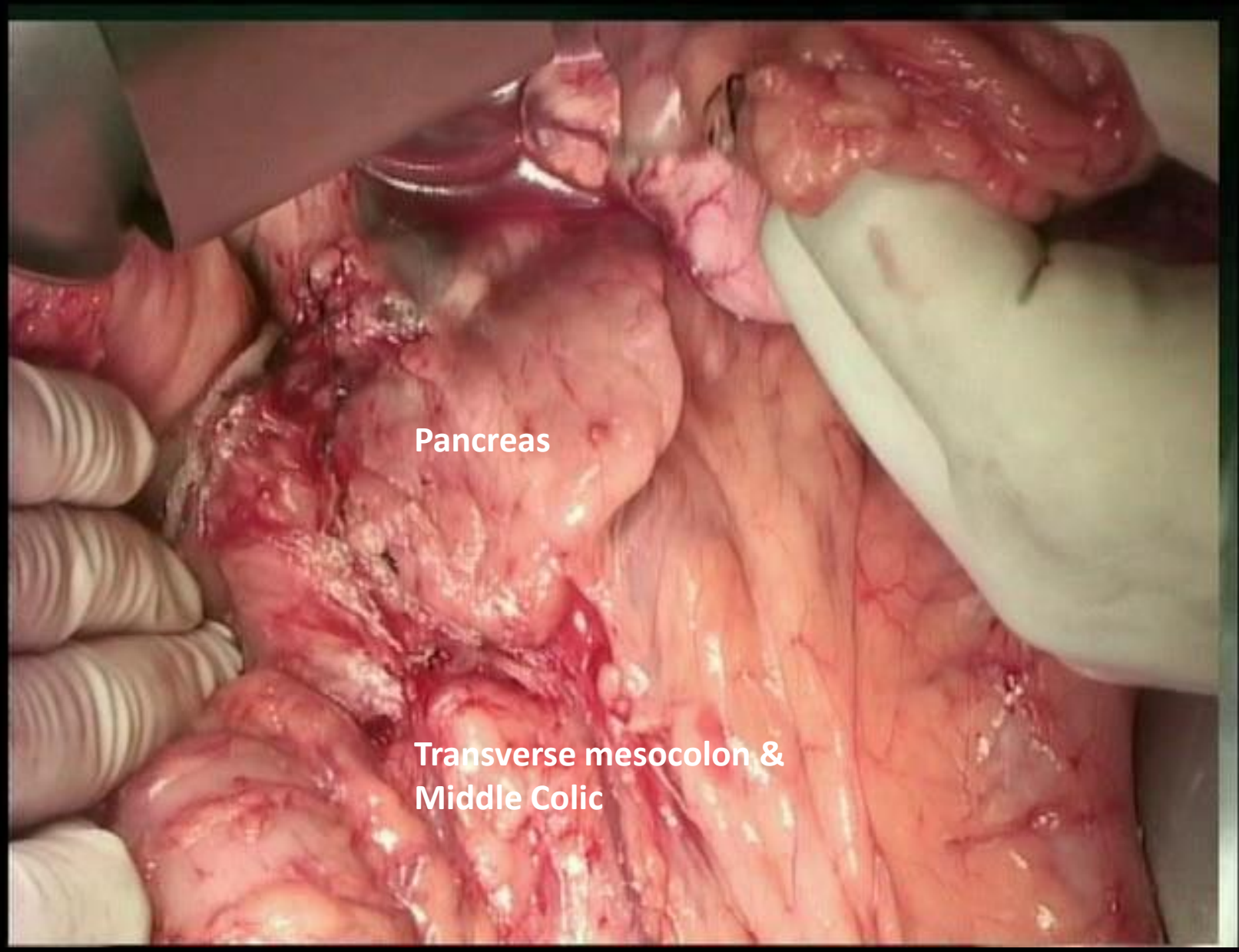
This involves removing all the nodes

along the

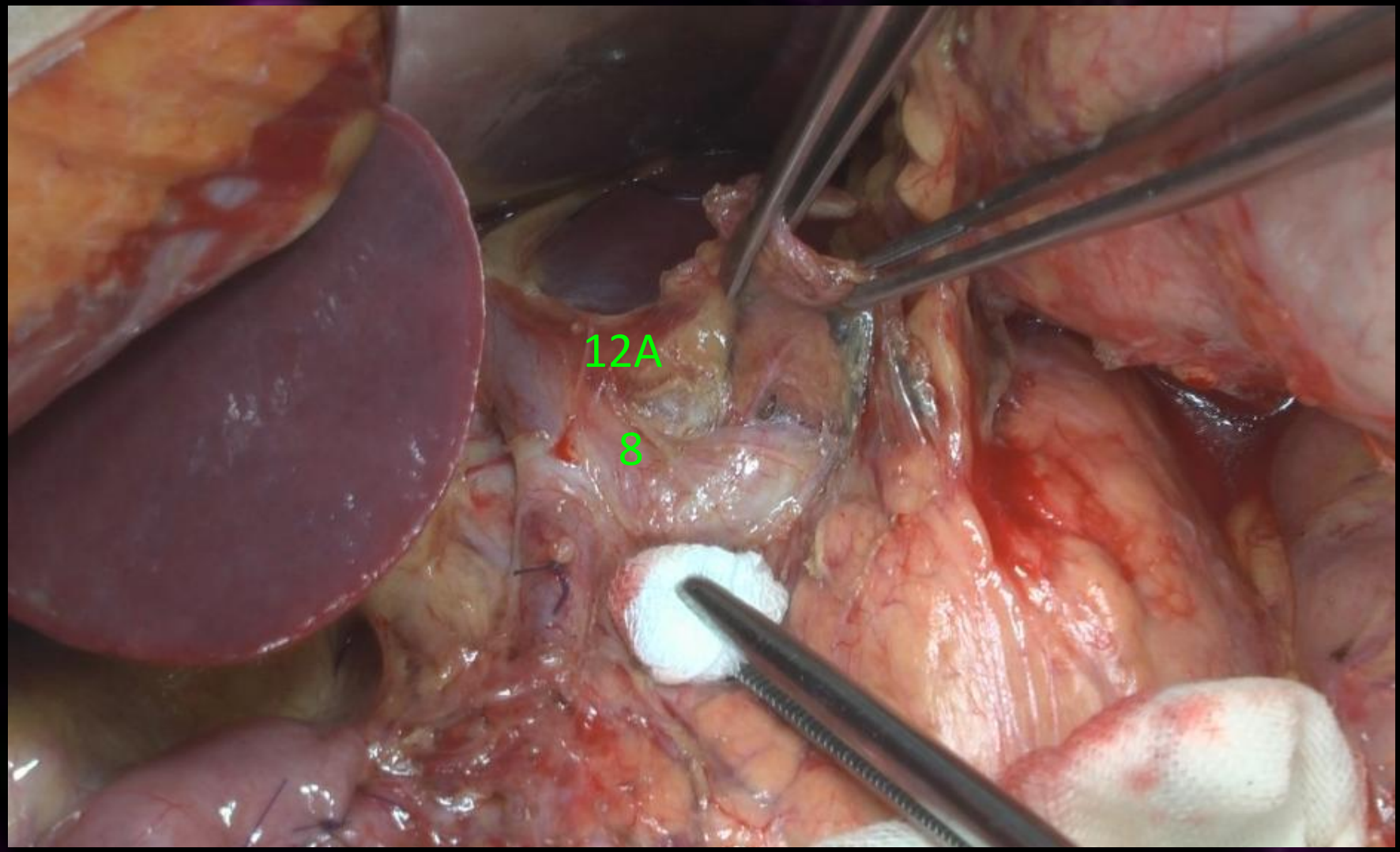
1. common hepatic artery,
2. nodes behind and within the hepatoduodenal ligament,
3. nodes along and around the celiac artery,
4. the trunk of the splenic artery and
5. the cranial margin and surface of the pancreas.



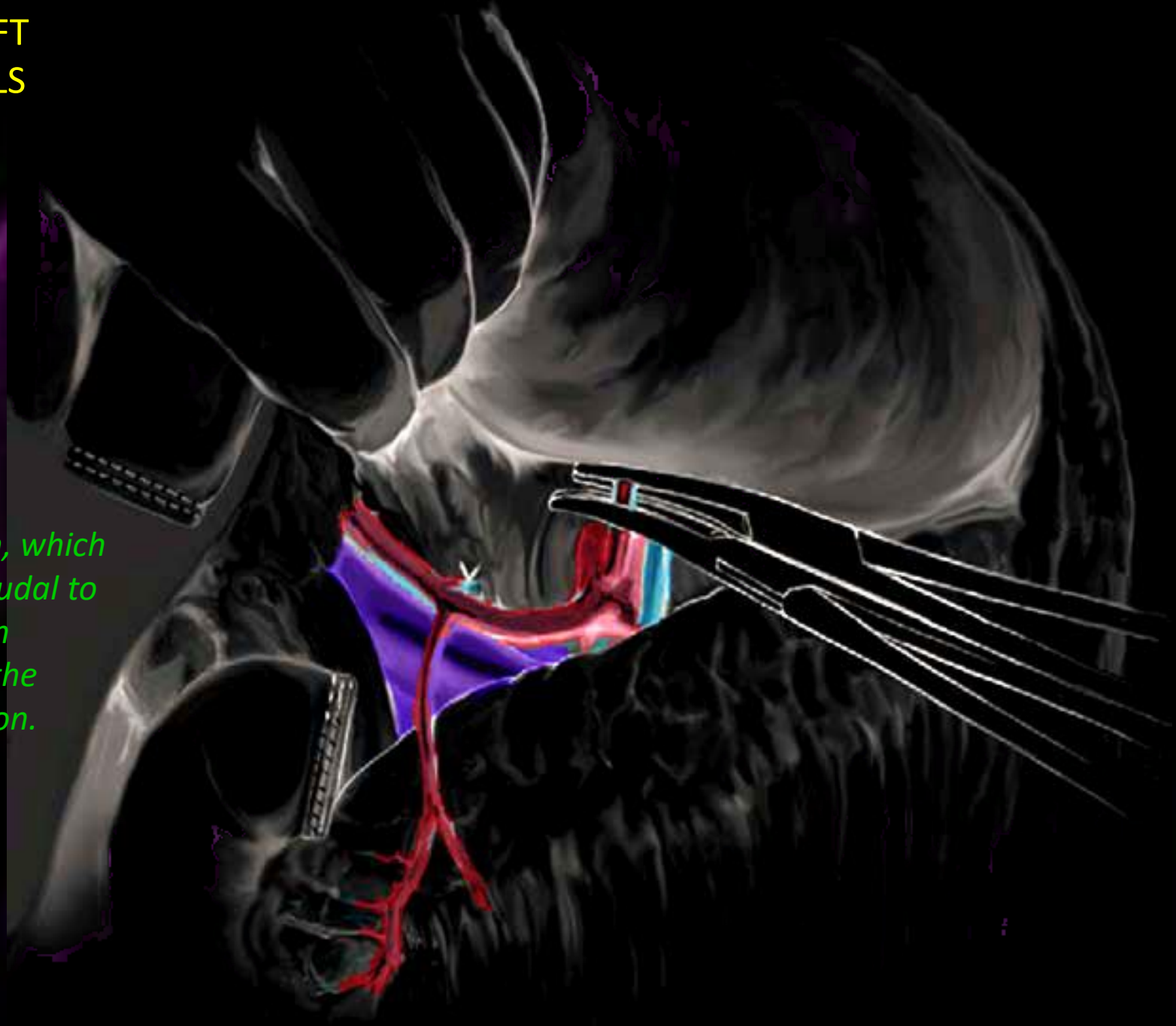
Lesser Sac



12 and 8 lymph nodes

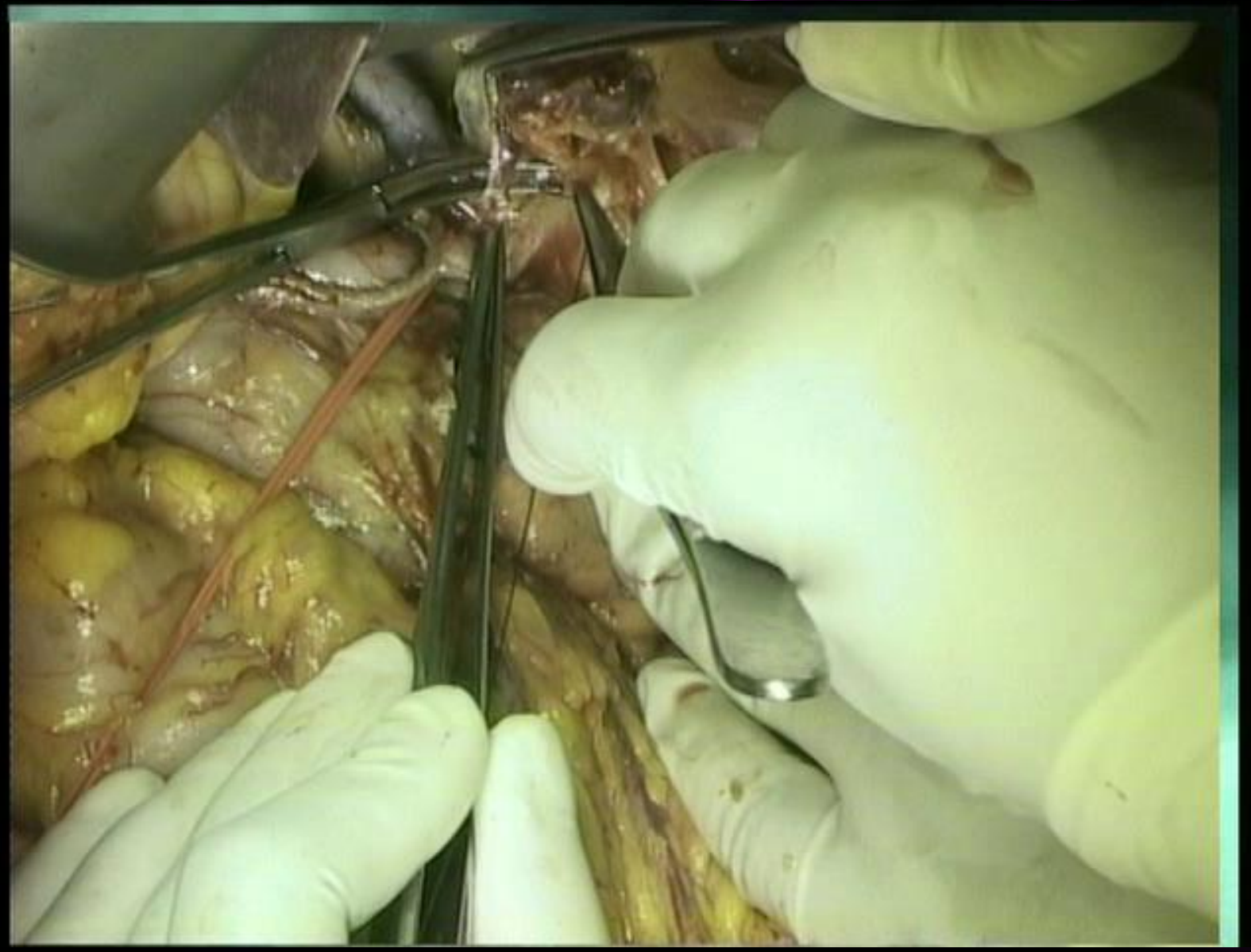


DIVISION OF LEFT GASTRIC VESSELS

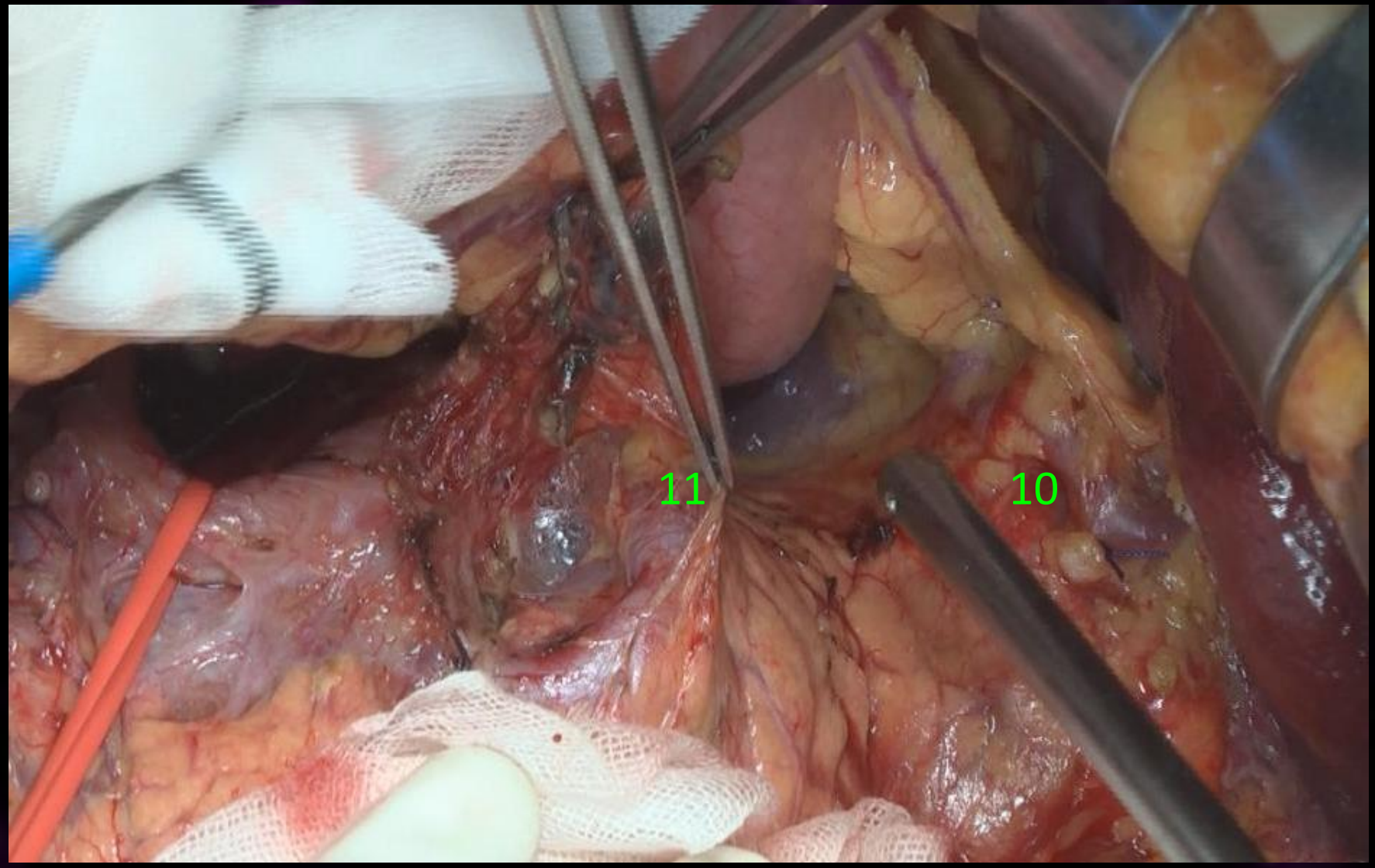


The coronary vein, which is situated just caudal to the artery, is often identified first in the course of dissection.

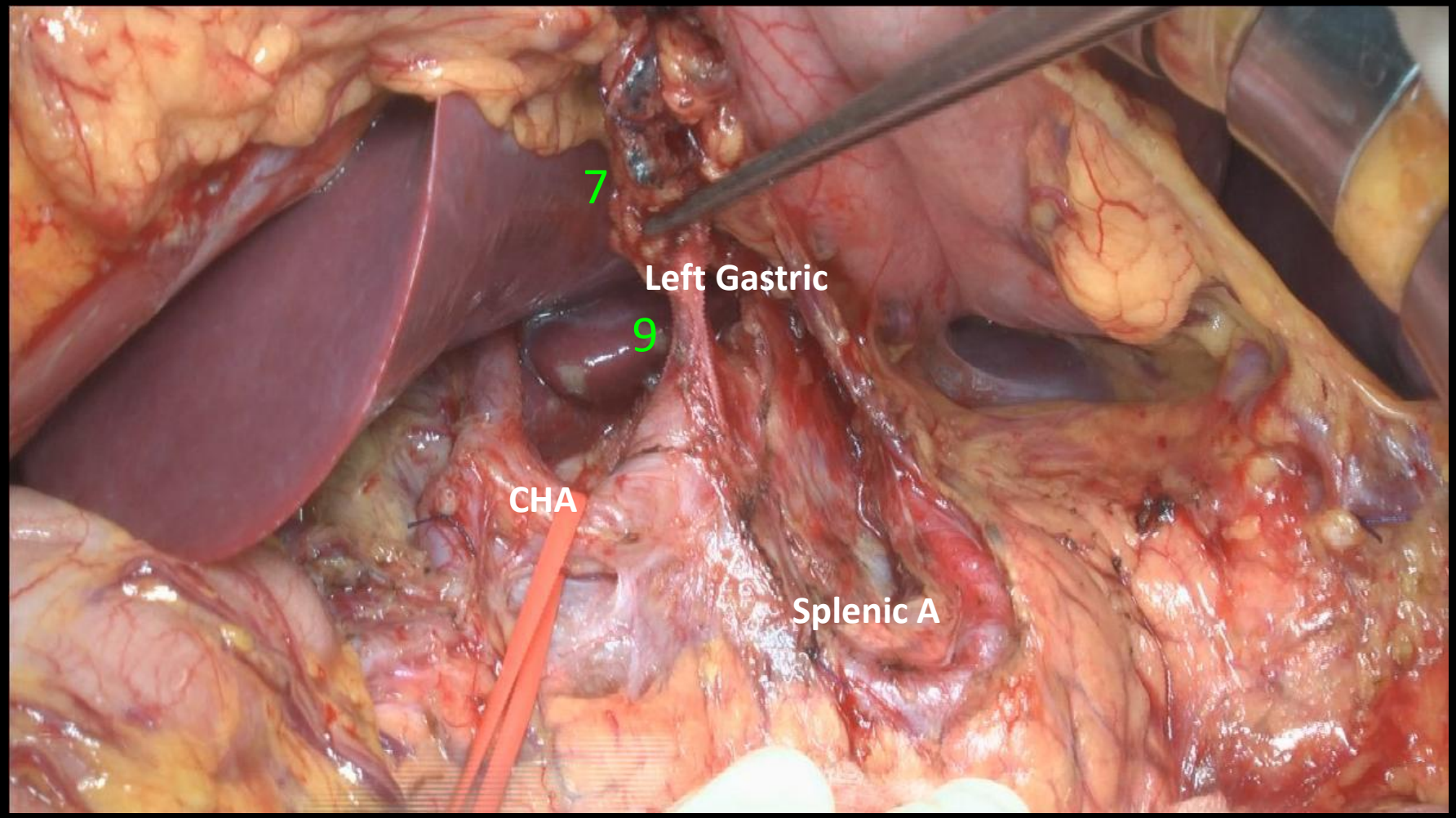
Coronary vein



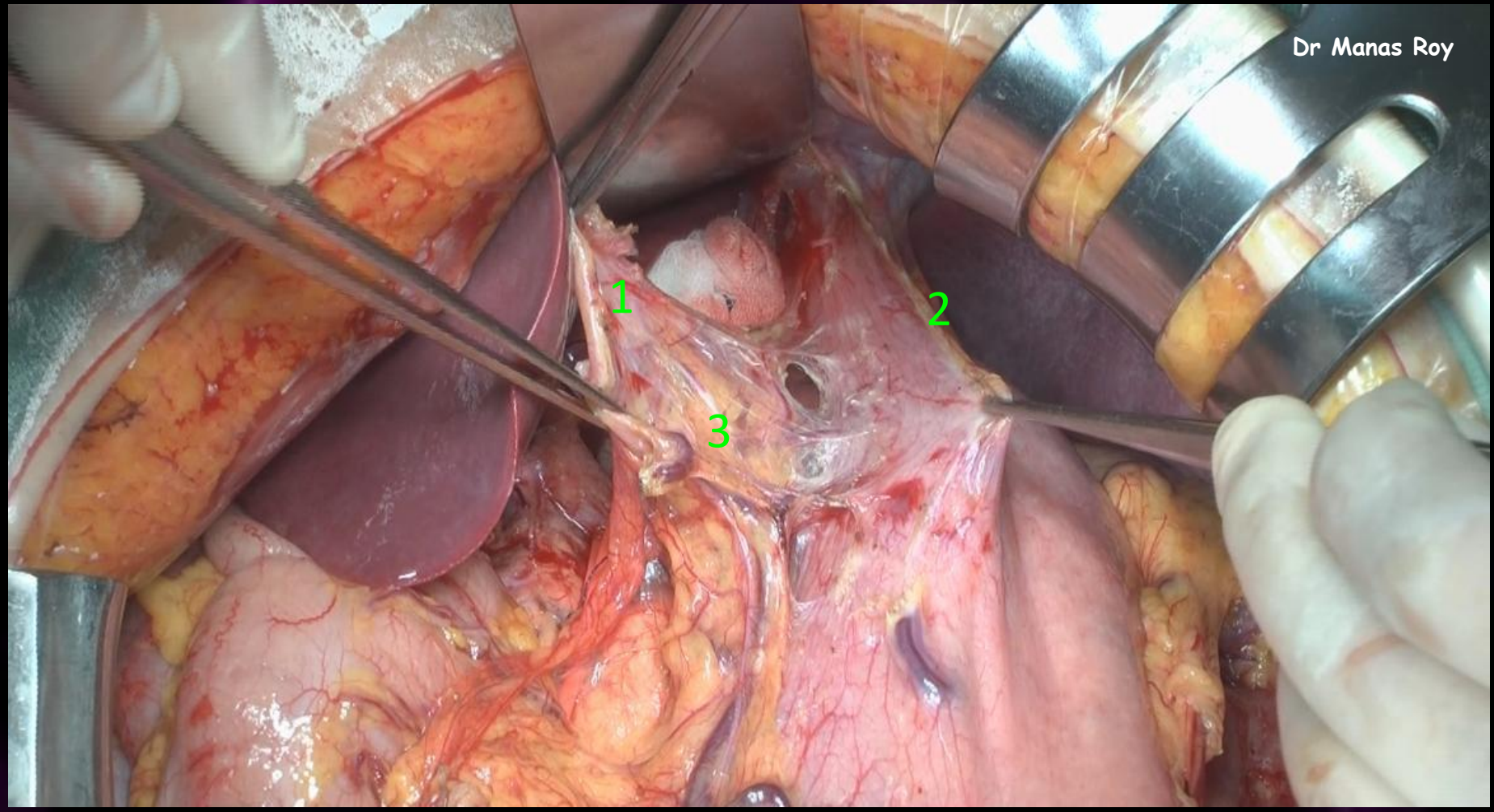
Dissection along splenic artery



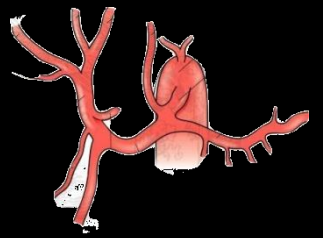
Completion of dissection along upper border of Pancreas

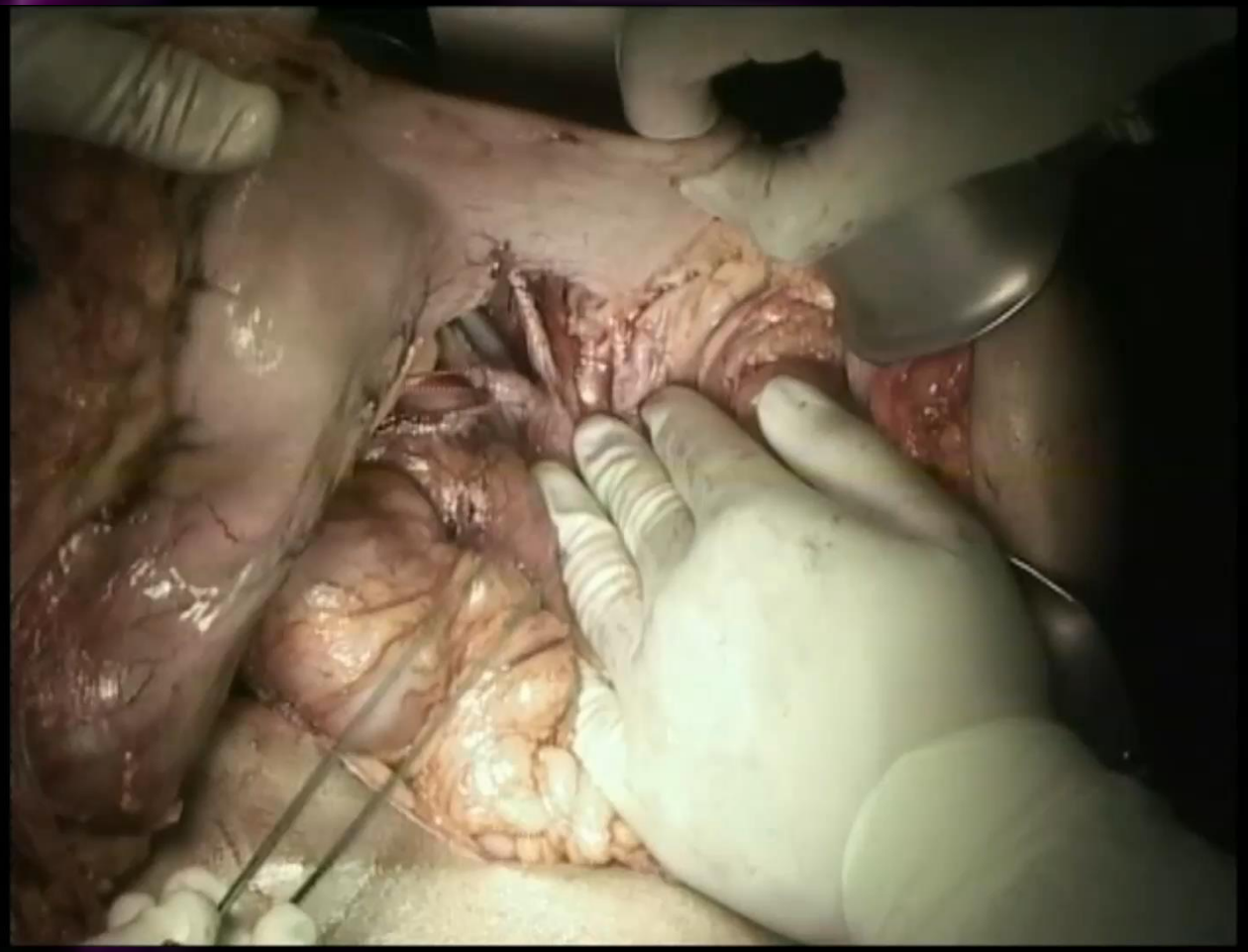


Completion of dissection of lesser curve

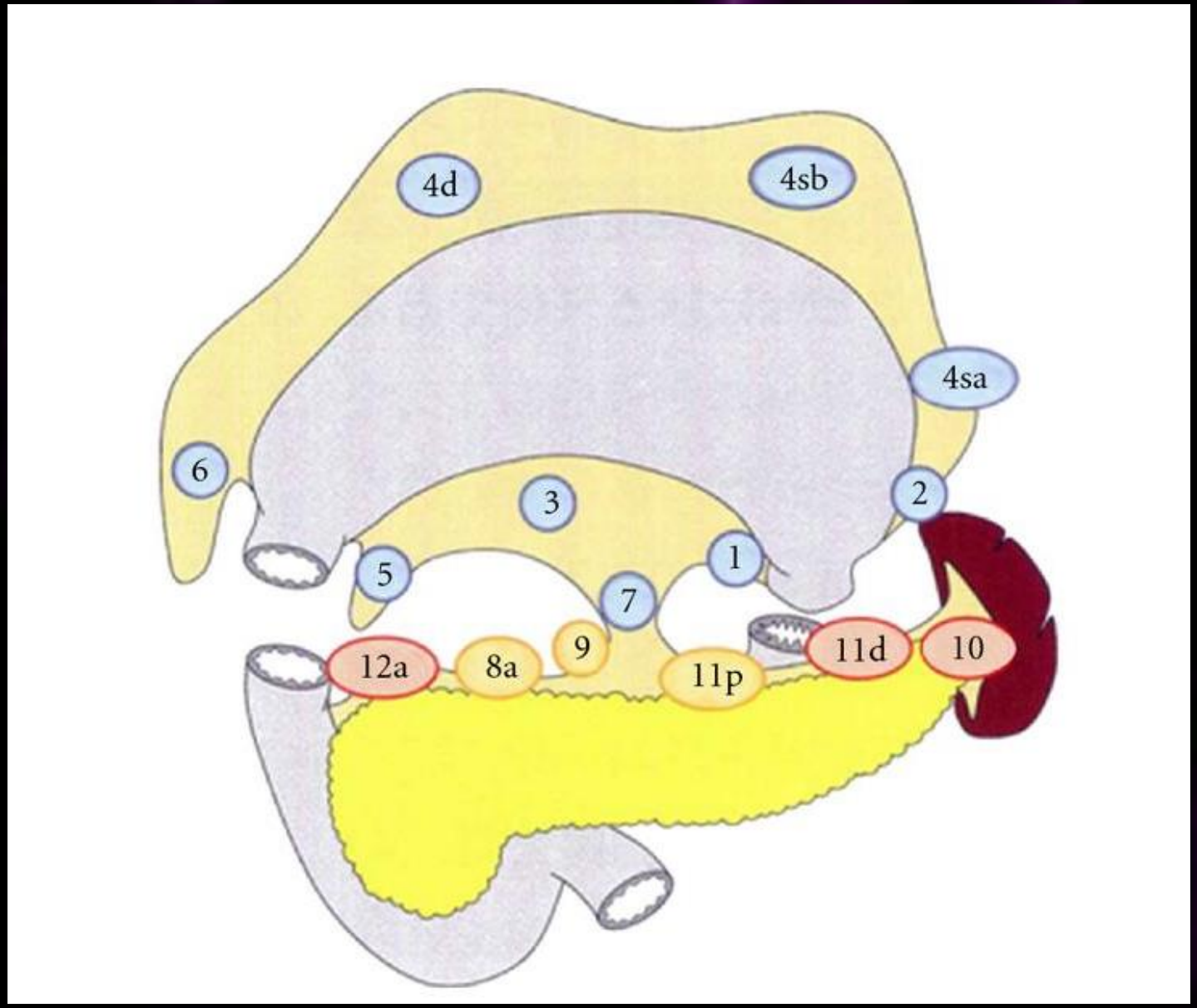


Completed dissection

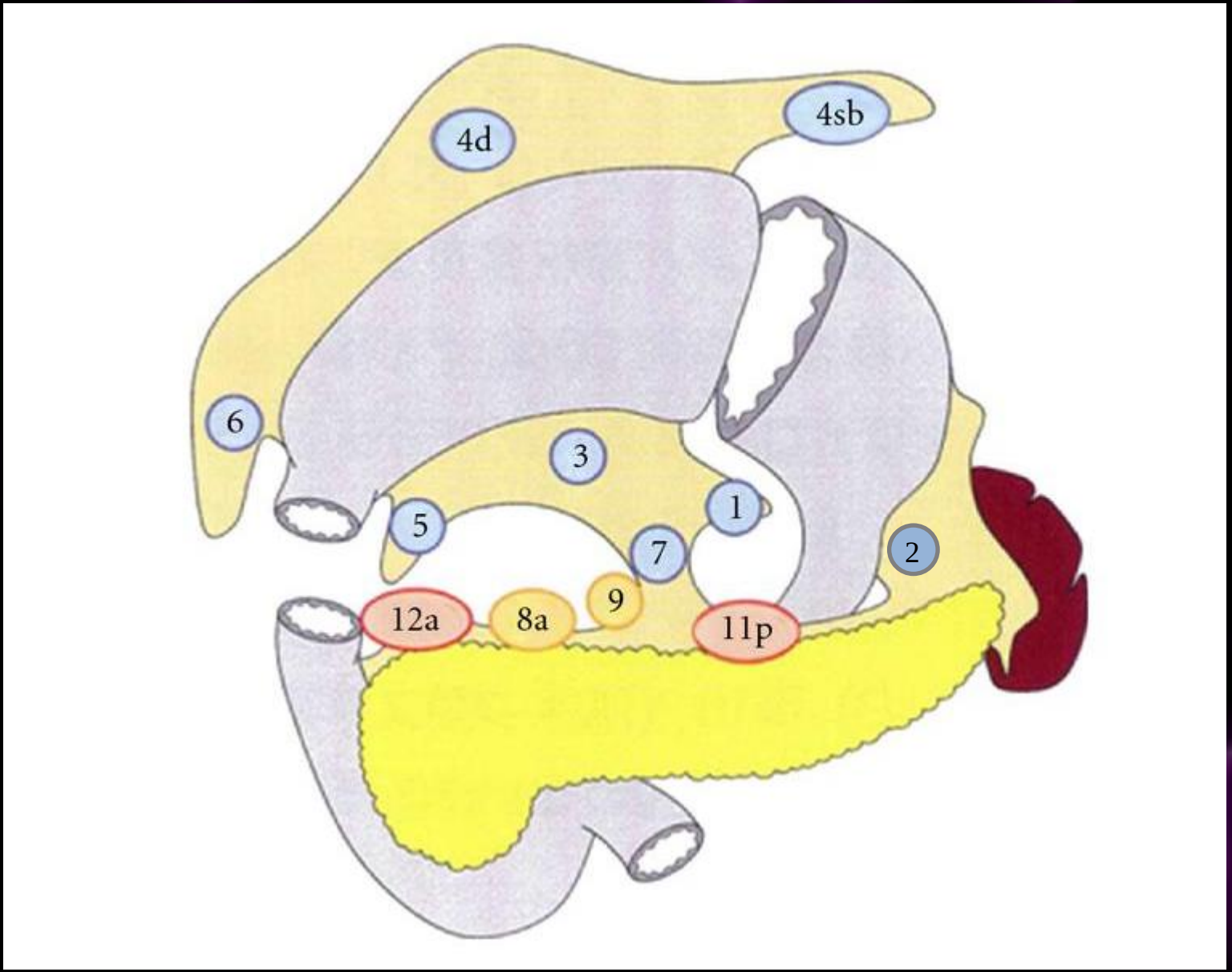




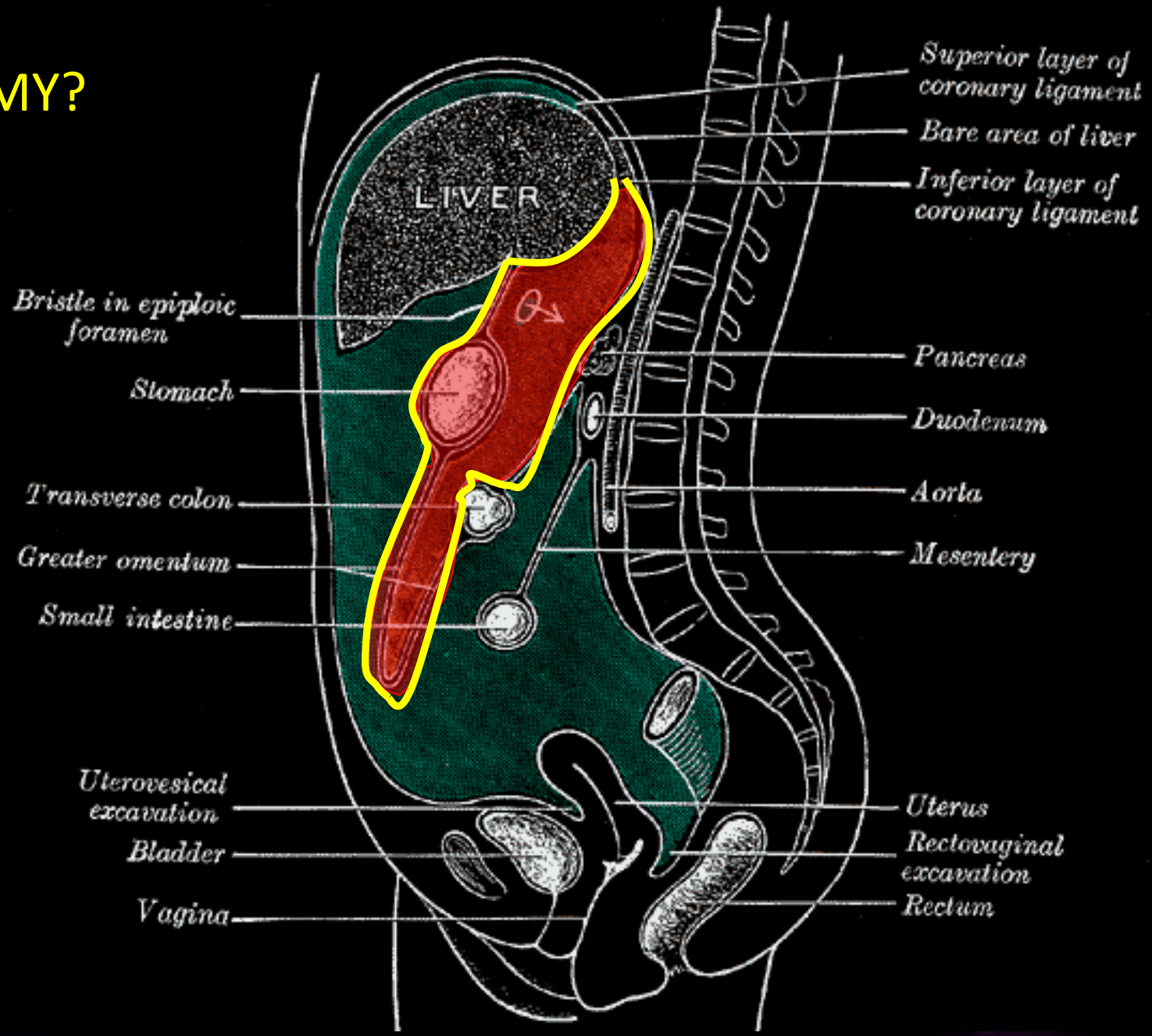
D2 TOTAL GASTRECTOMY



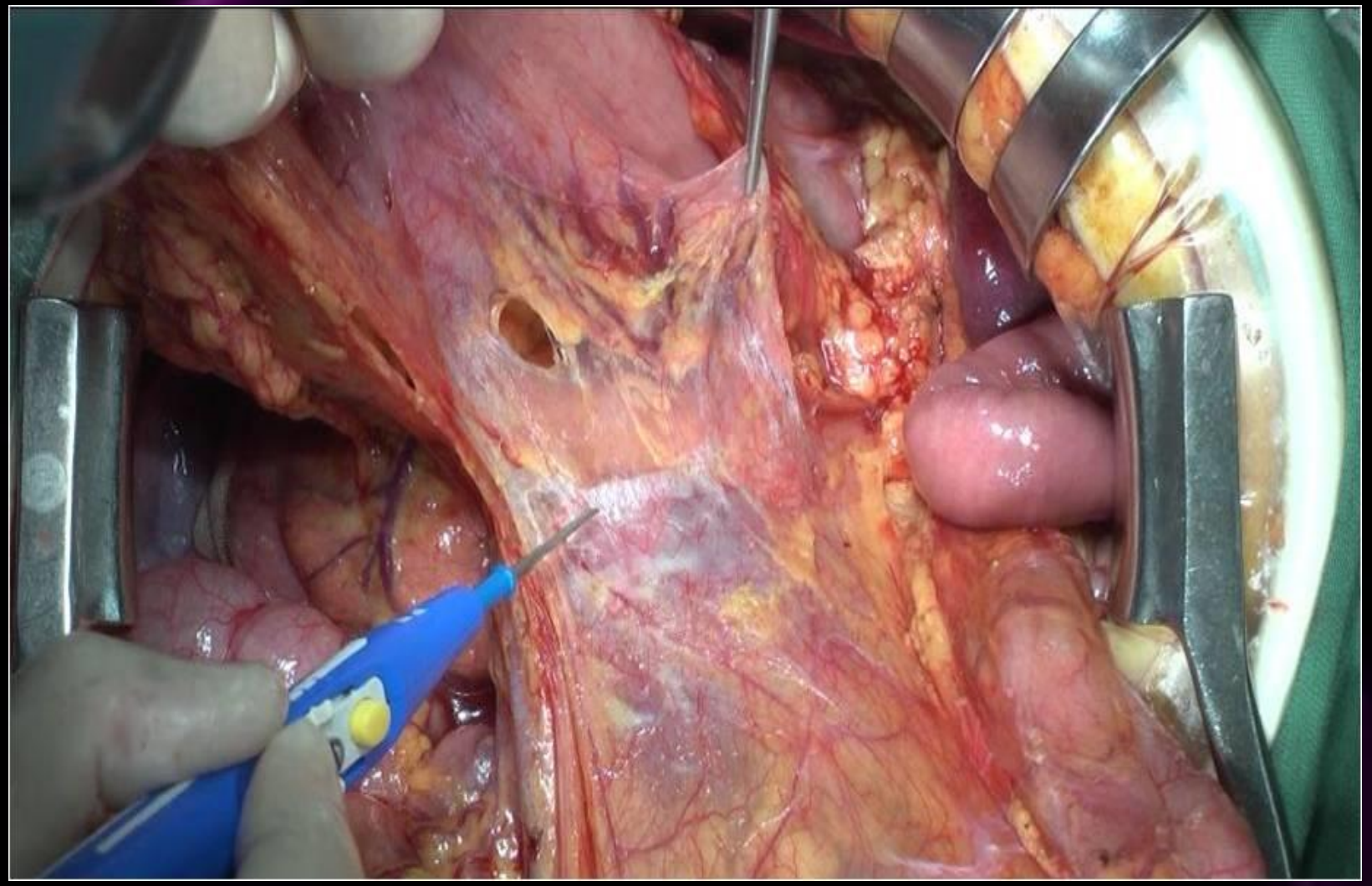
D2 DISTAL GASTRECTOMY



BURSECTOMY?


LIVER
Superior layer of coronary ligament
Bare area of liver
Inferior layer of coronary ligament
Bristle in epiploic foramen
Stomach
Transverse colon
Greater omentum
Small intestine
Pancreas
Duodenum
Aorta
Mesentery
Uterovesical excavation
Bladder
Vagina
Uterus
Rectovaginal excavation
Rectum

Bursectomy

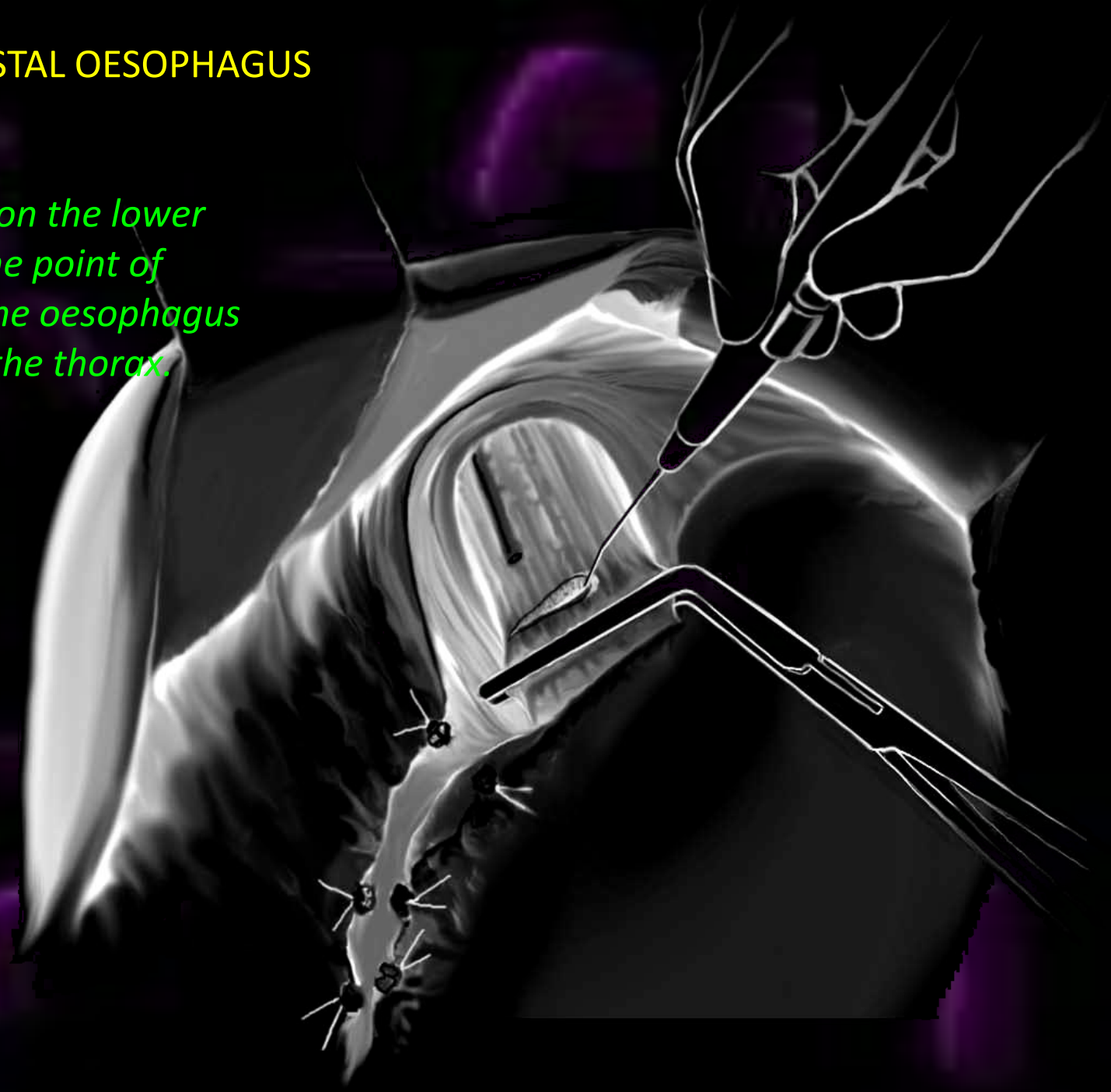


MOBILISING LEFT LIVER LOBE AND THE ESOPHAGOGASTRIC JUNCTION

The left triangular ligament is divided if needed to enable the left lobe of the liver to be gently folded away from the oesophagogastric junction.

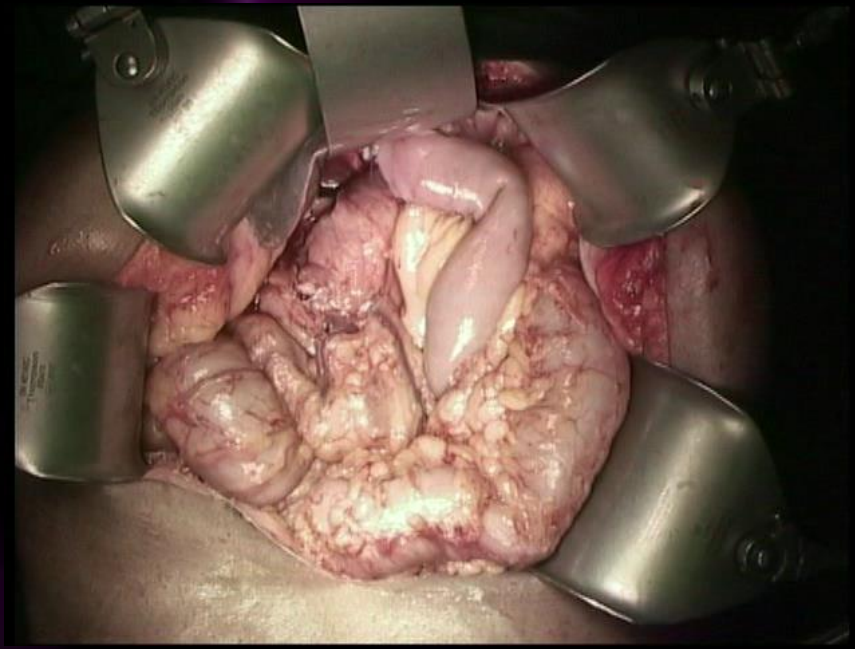
TRANSECTION OF DISTAL OESOPHAGUS

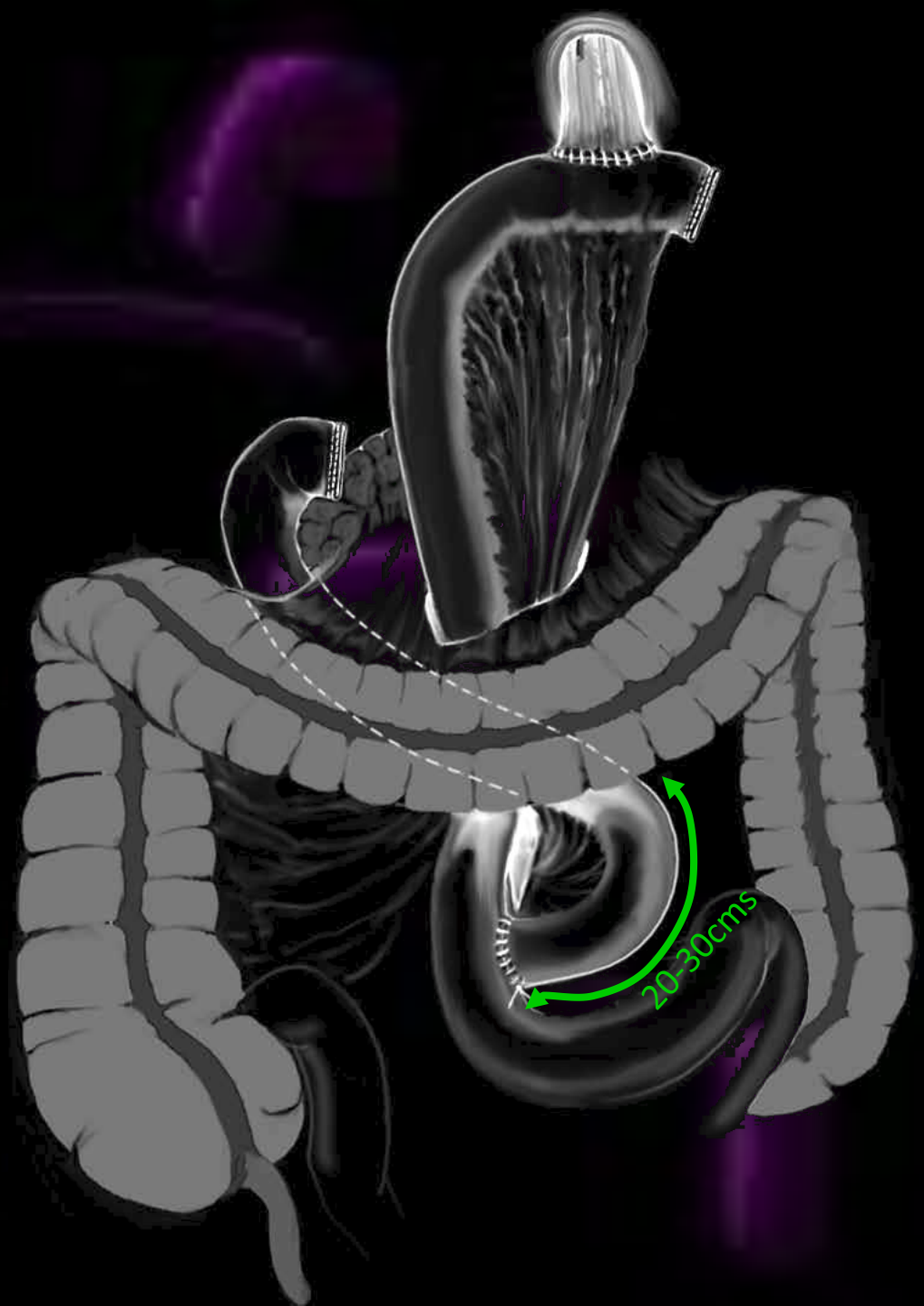
Putting a soft clamp on the lower oesophagus above the point of tranasection, stops the oesophagus from retracting into the thorax.



ROUX-EN-Y RECONSTRUCTION

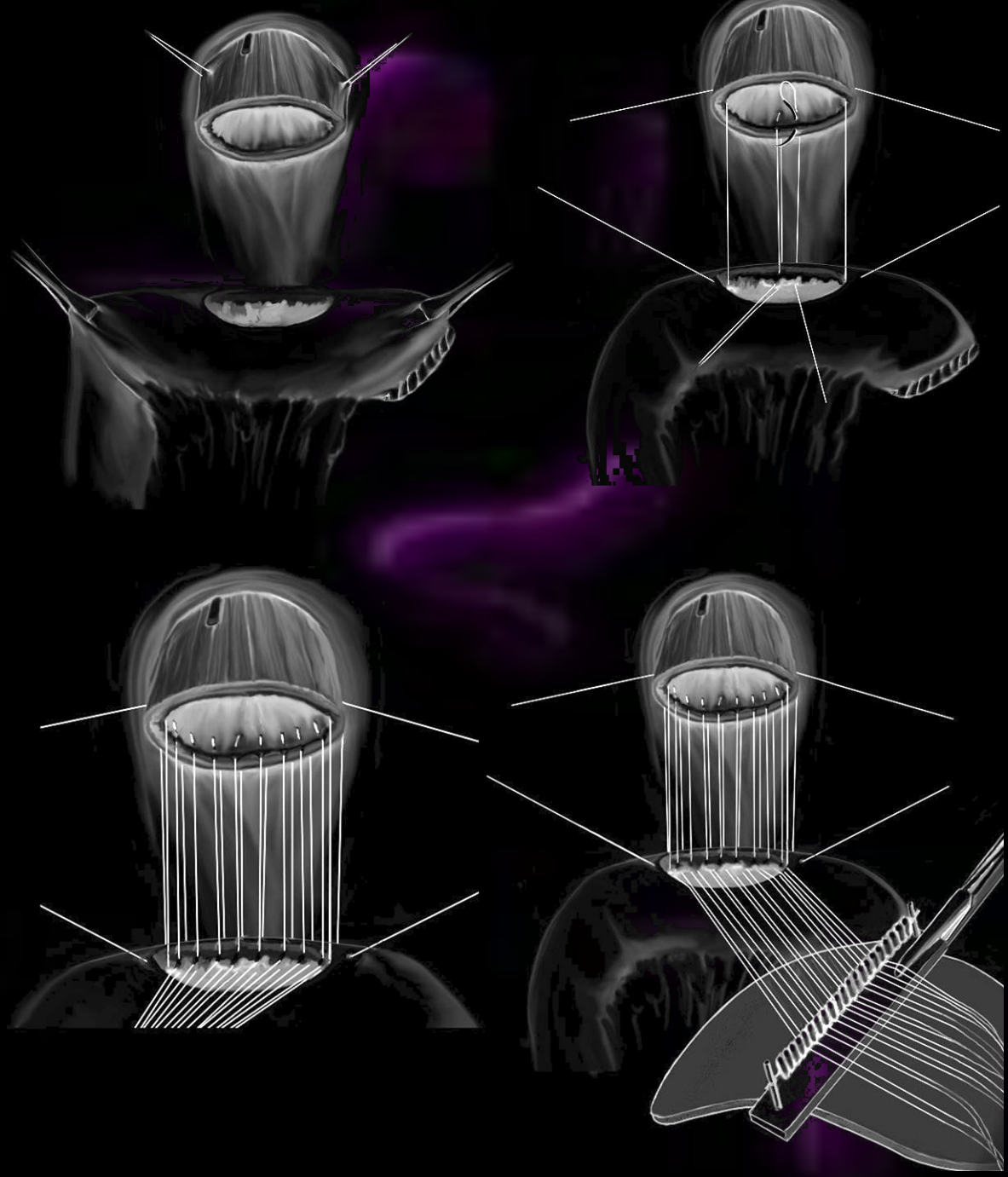
The jejunal loop is elevated about 20–30cm beyond the ligament of Treitz





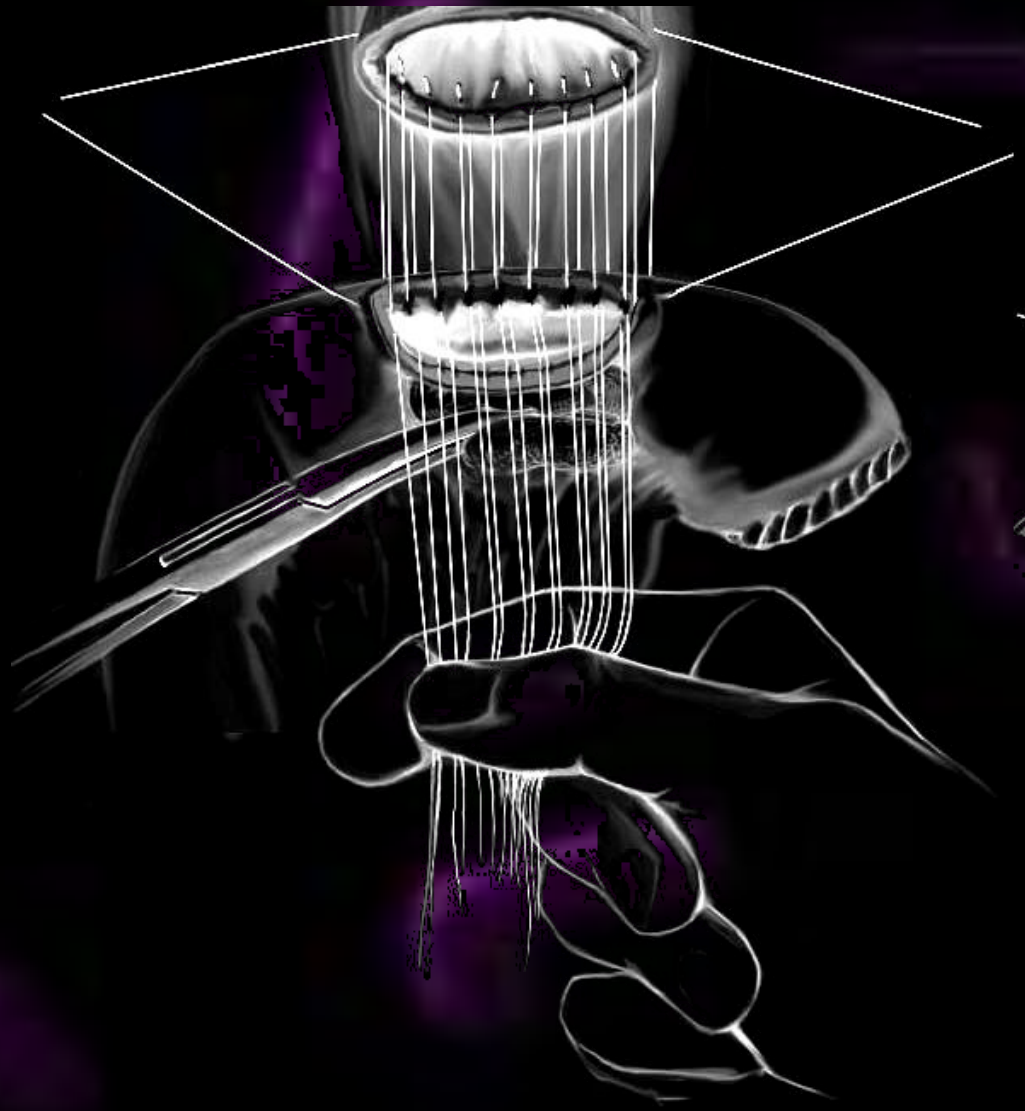
ROUX-EN-Y RECONSTRUCTION

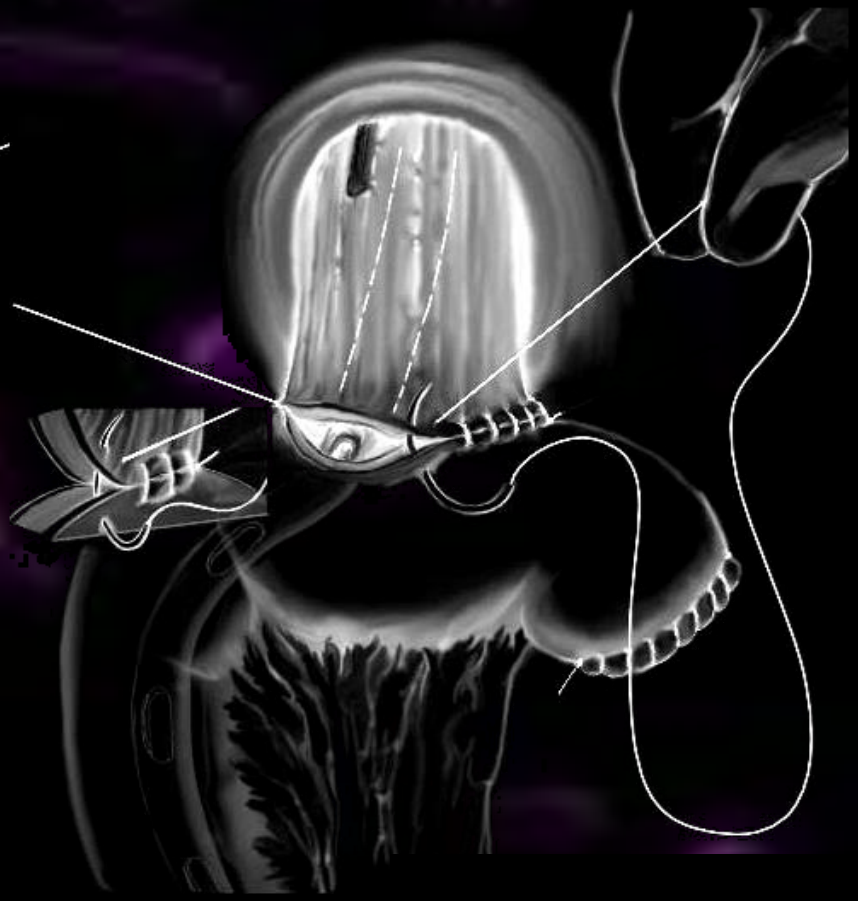
1. END-TO-SIDE ANASTOMOSIS
2. CORNER BITES – THROUGH – AND THROUGH; HALVE AGAIN EXTRAMUCOSALLY!
3. ALL POSTERIOR BITES – EXTRAMUCOSAL
4. “PARACHUTE” IN THE BITES

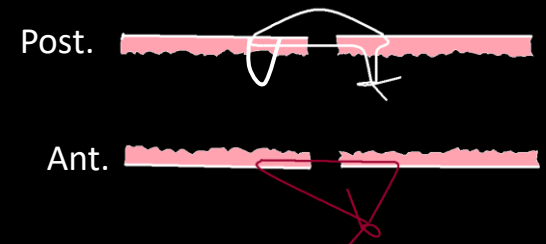


ROUX-EN-Y RECONSTRUCTION

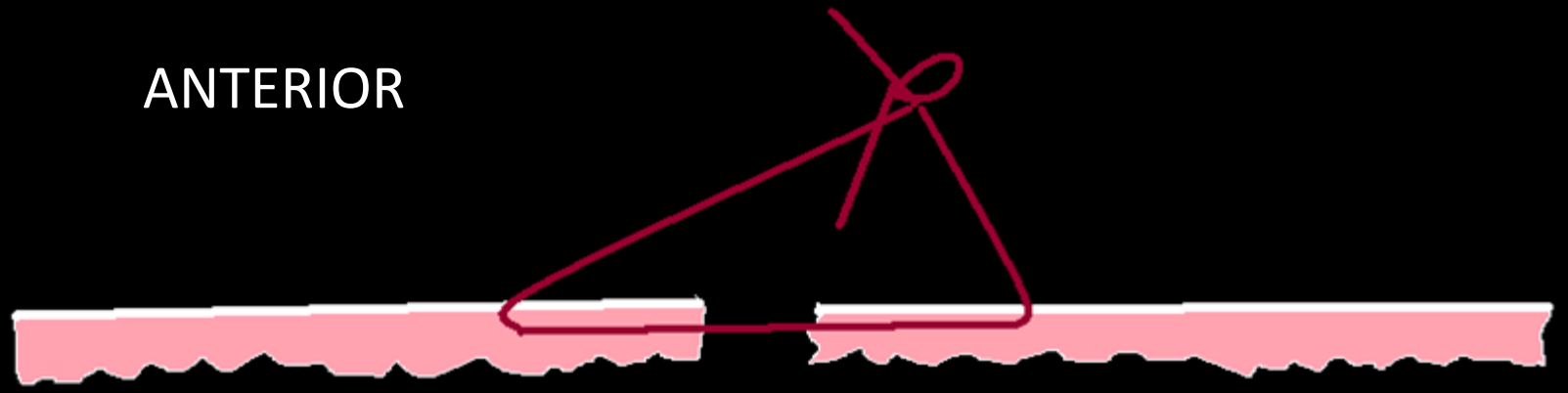
Anterior layer continuous or interrupted extra-mucosal



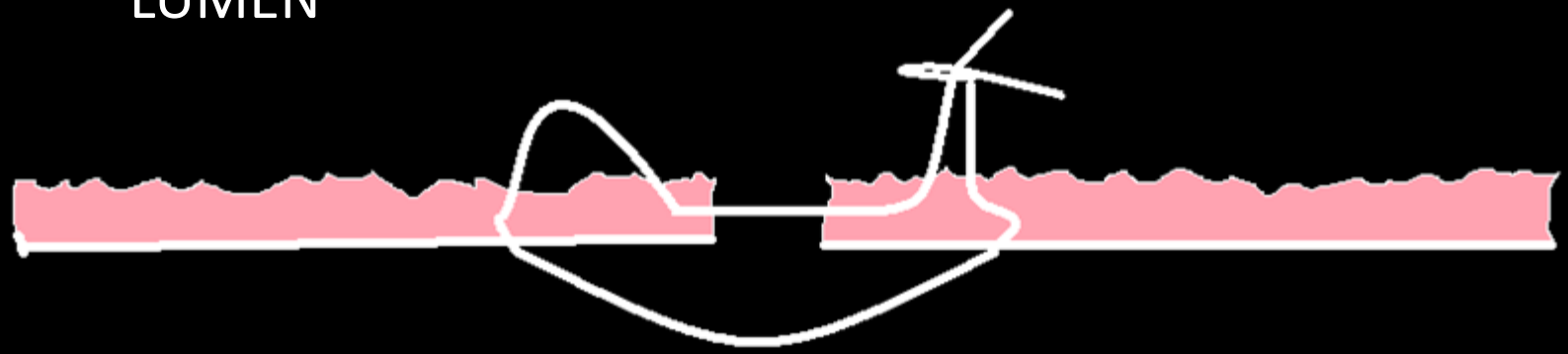




ANTERIOR



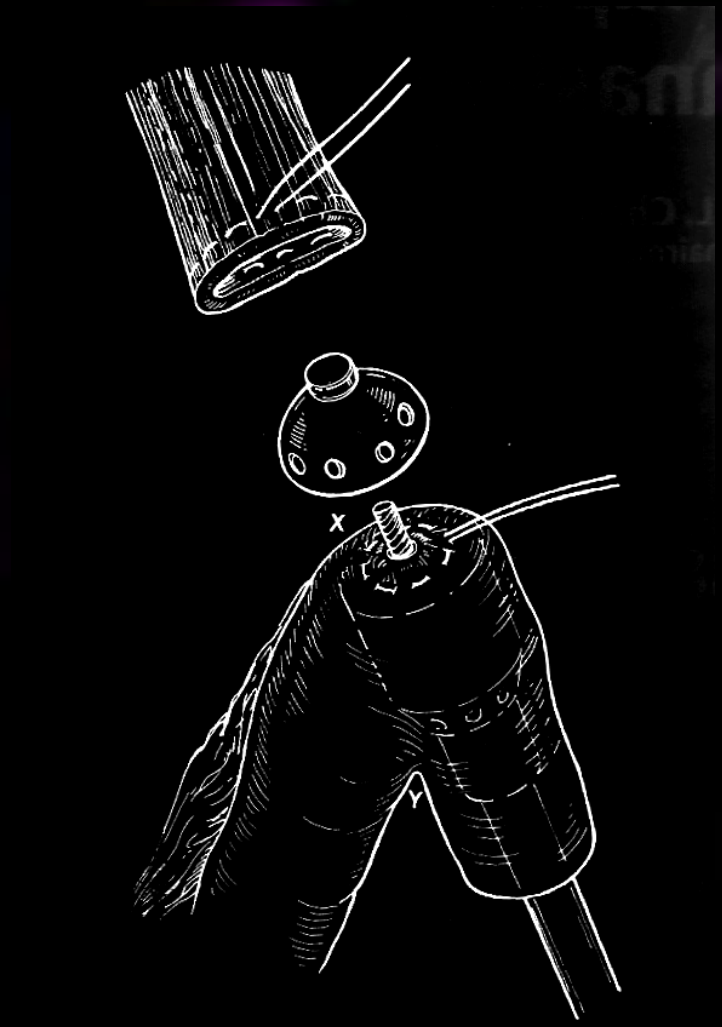
LUMEN

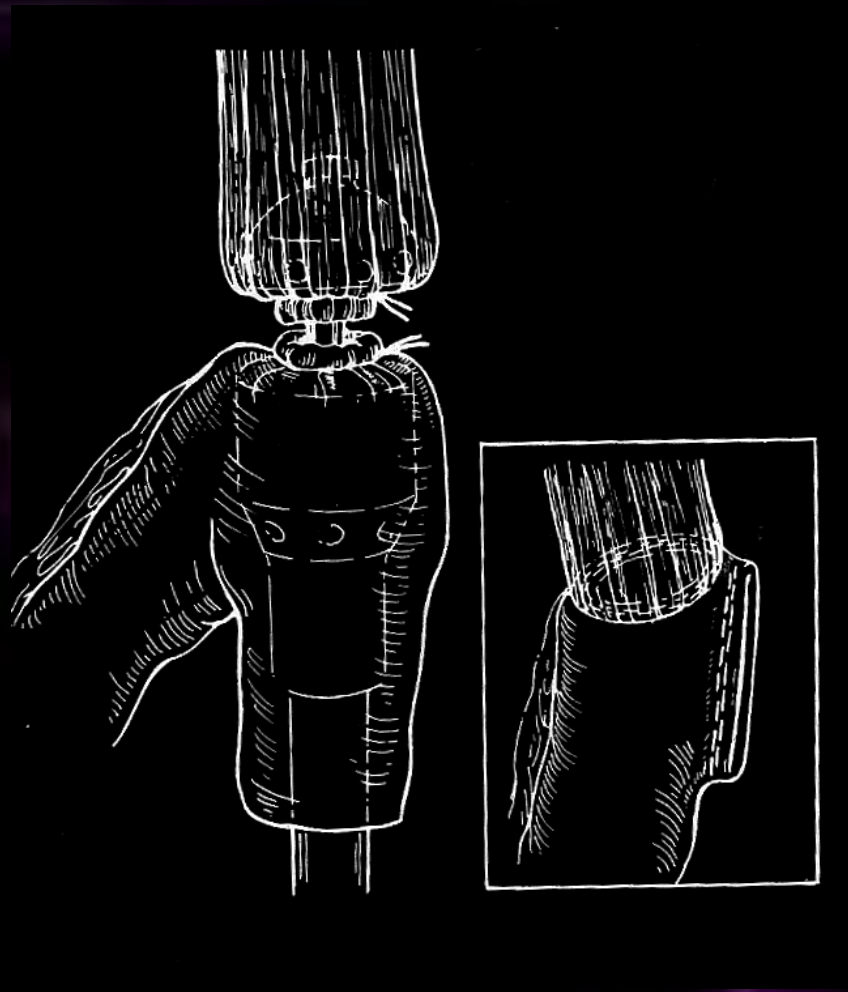


POSTERIOR

ROUX-EN-Y RECONSTRUCTION

STAPLED ANASTOMOSIS





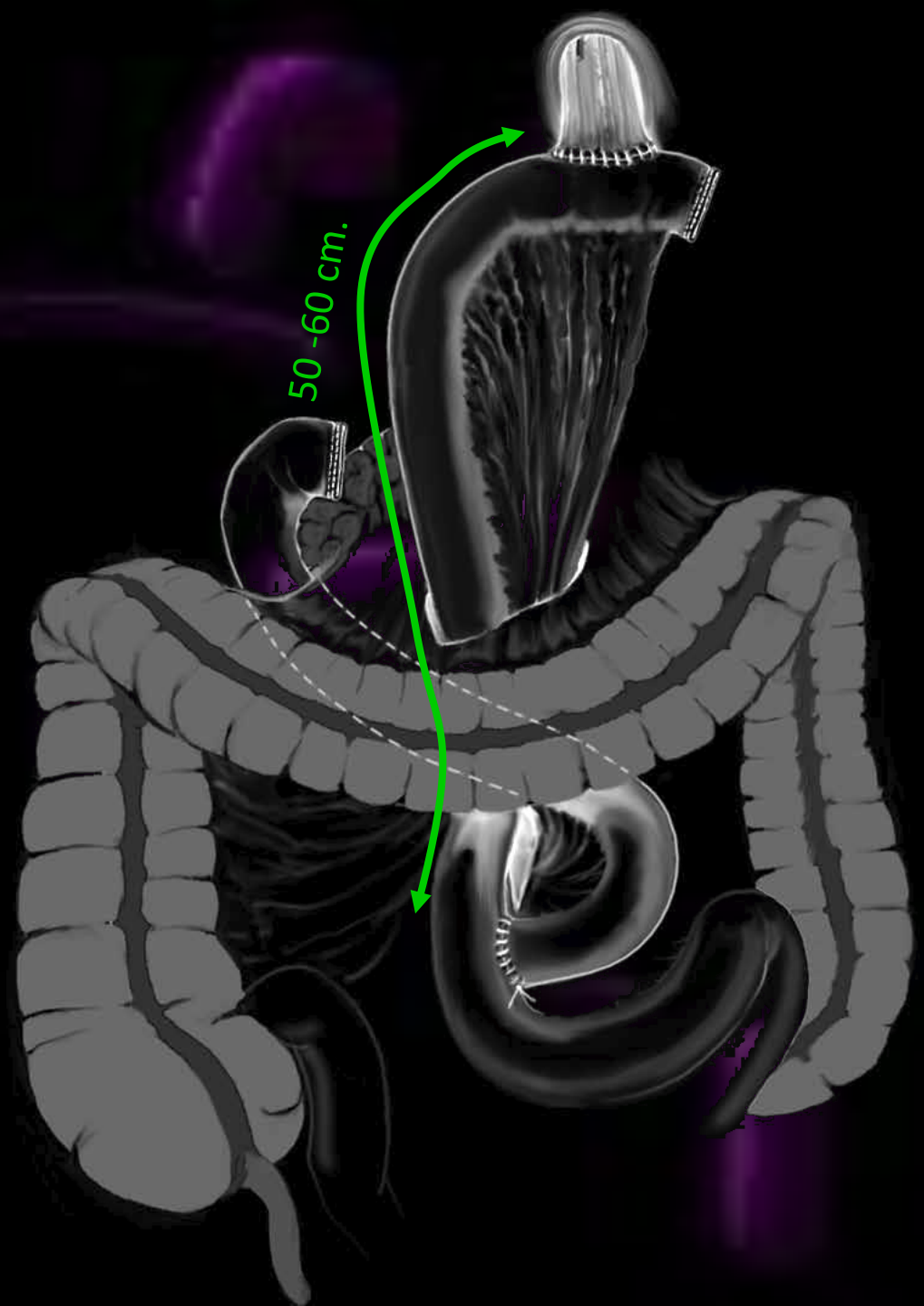
RECONSTRUCTION OF THE INTESTINE

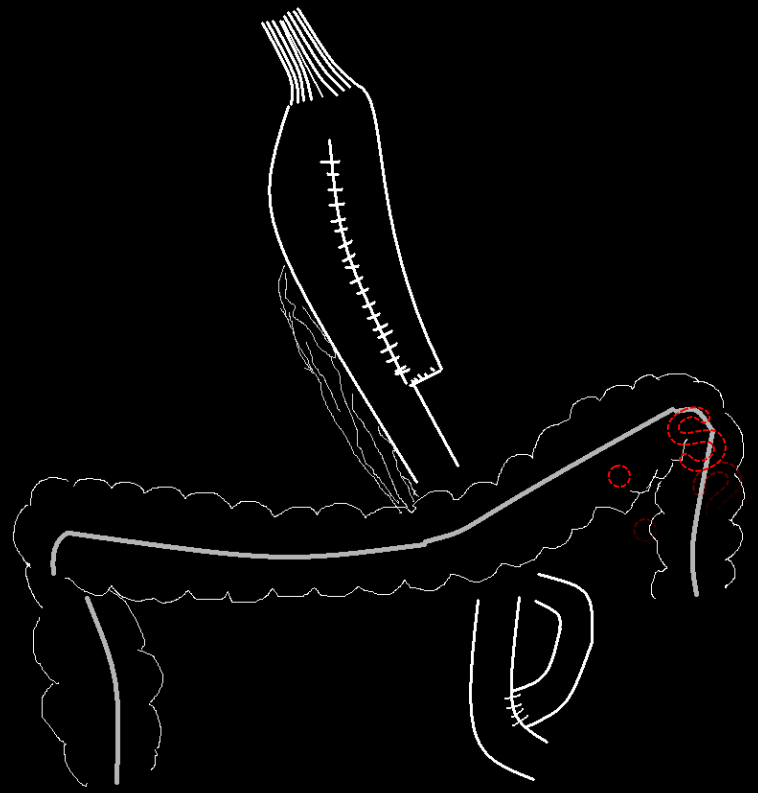
Created at a point 50–60cm below the oesophagojejunostomy, an end-to-side jejunojejunostomy is performed using a continuous extramucosal suture technique.

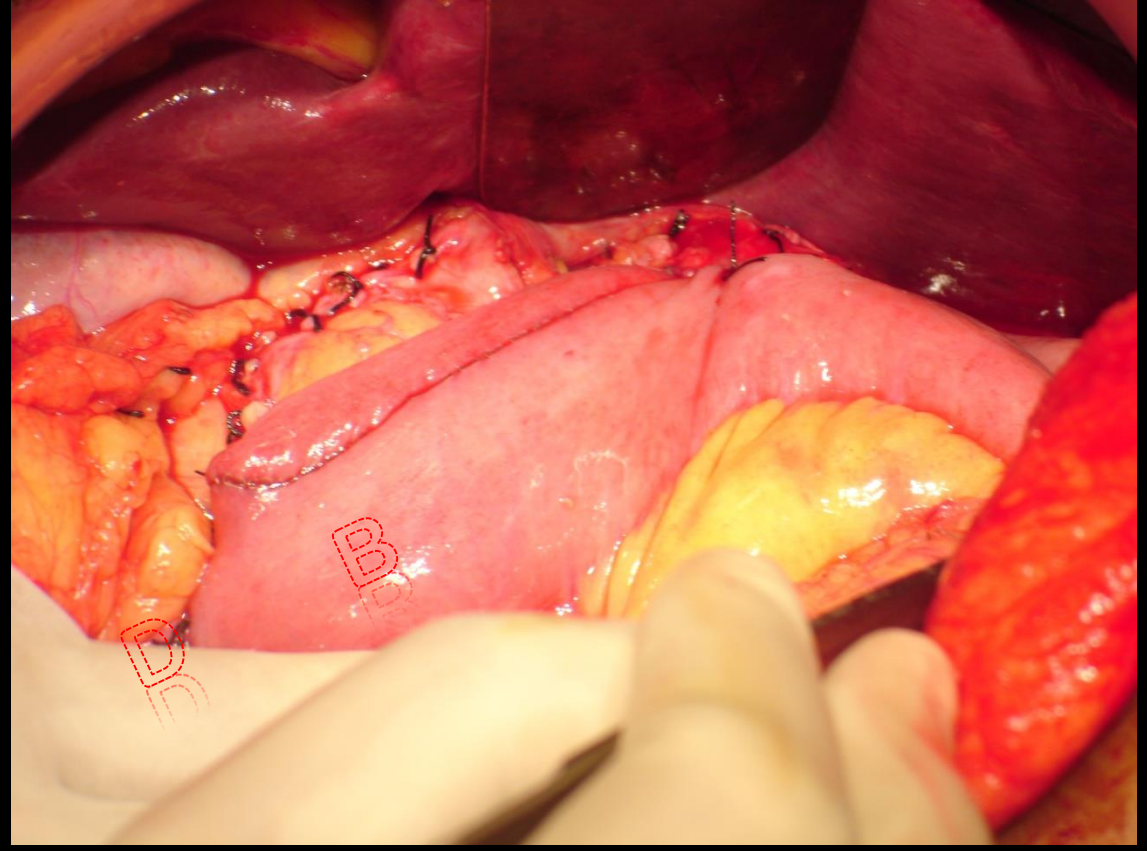
All openings in the mesentery are closed

Two drains are placed behind the oesophagojejunostomy and around the duodenal stump.

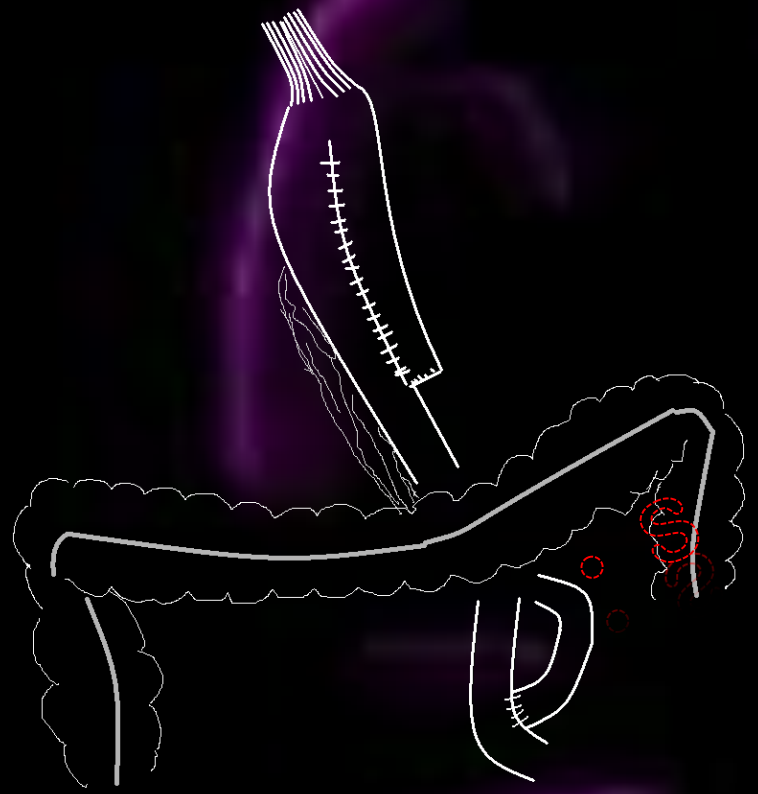
CLOSURE OF ABDOMEN

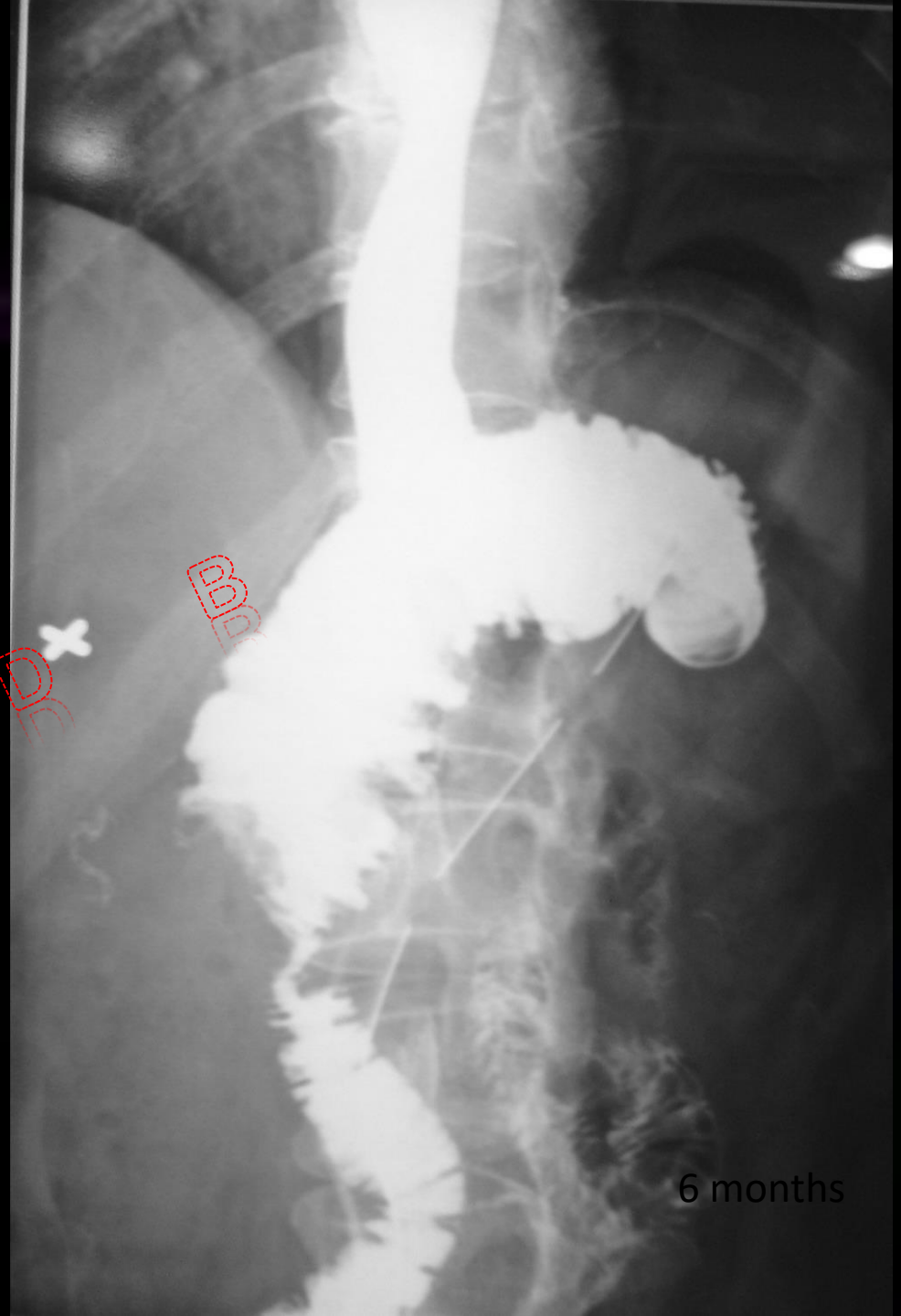






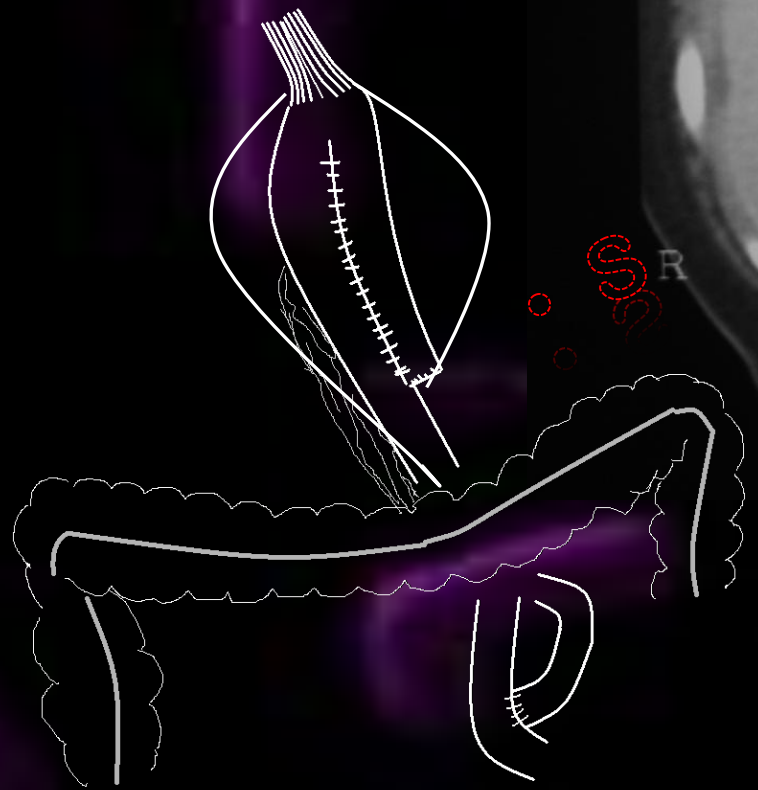
10 days

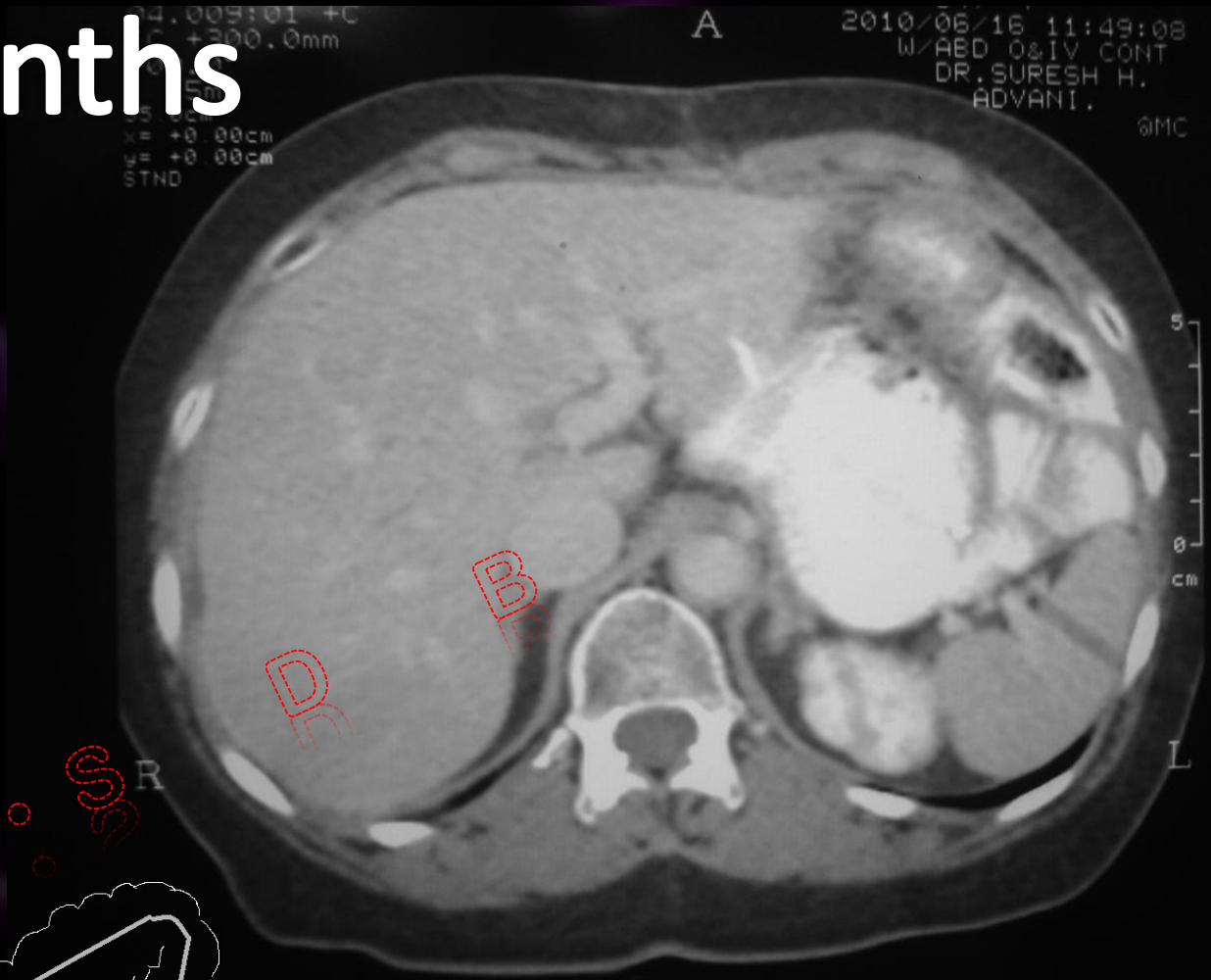




6 months

At 6 months





24 months

TWENTY YEARS ON-
EXTENT OF RESECTION

- The multicenter LOGICA-trial randomized laparoscopic versus open D2-gastrectomy for resectable gastric adenocarcinoma (cT1–4aN0–3bM0) in 10 Dutch hospitals.
- DG was performed for non-proximal tumors if R0-resection was deemed achievable, TG for other tumors.
- If oncologically feasible, DG should be preferred over TG due to less complications, faster postoperative recovery, and better QoL while achieving equivalent oncological effectiveness.

de Jongh C, van der Veen A, Brosens LAA, Nieuwenhuijzen GAP, Stoot JHMB, Ruurda JP, van Hillegersberg R; LOGICA Study Group. Distal Versus Total D2-Gastrectomy for Gastric Cancer: a Secondary Analysis of Surgical and Oncological Outcomes Including Quality of Life in the Multicenter Randomized LOGICA-Trial. J Gastrointest Surg. 2023 Sep;27(9):1812-1824. doi: 10.1007/s11605-023-05683-z. Epub 2023 Jun 20. PMID: 37340107; PMCID: PMC10511620.

Postoperative Complications:-

Short term:

- – Intra-abdominal bleeding.
- – Subphrenic abscess.
- – Anastomotic leak.
- – Pancreatic fistula.
- – Duodenal stump leak.
- – CBD injury.

Long term:

- – Weight loss, decreasing nutritional status (reservoir capacity).
- – Diarrhea.
- – Dumping syndrome.
- – Alkaline reflux.
- – Blind loop syndrome.
- – Intestinal Obstruction.
- – Recurrence.

Further Reading

- Significance of Lymph Node Metastasis in the Treatment of Gastric Cancer and Current Challenges in Determining the Extent of Metastasis. Kinami S, Saito H, Takamura H. Front. Oncol., 07 January 2022. Sec. Surgical Oncology, https://doi.org/10.3389/fonc.2021.806162
- Bailey & Love's Short Practice of Surgery 26th Ed.
- Clavien_Atlas of Upper Gastrointestinal and Hepato-Pancreato-Biliary Surgery
- Shackelford's Surgery of the Alimentary Tract. 7th Ed.
- www.cccsurgeryclinics.com

Presentation will be available at
www.drsanjaydebakshi.org