Surgical Treatment of Gastric Cancer

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“All diseases according to Hippocratic theory, were caused by the absorption of black bile from the bowel into the blood,

and were therefore cured by purging, enemas, and blood-lettings.”

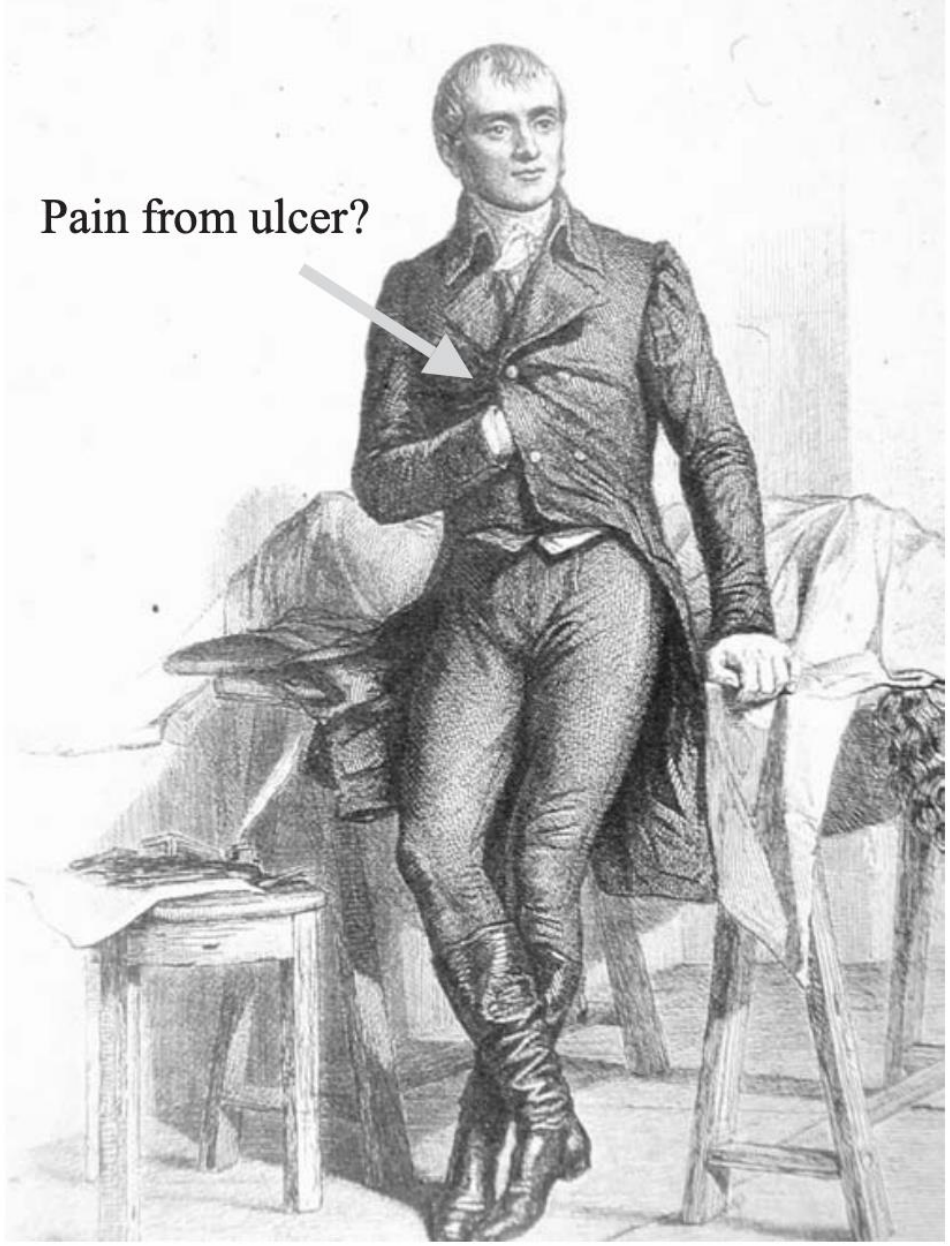


Fig. 1. Napoleon Bonaparte suffered from vague abdominal symptoms, perhaps due to chronic gastritis which preceded his familial gastric cancer

The autopsy reports show that Napoleon had and extensive scirrhous carcinoma of the stomach. (1821)

The First Surgery

- The official history of gastric cancer surgery began on the 9th of April, 1879
- Jules Emile Pean, a very famous French surgeon
- Performed the first gastric resection for cancer

The first successful operation

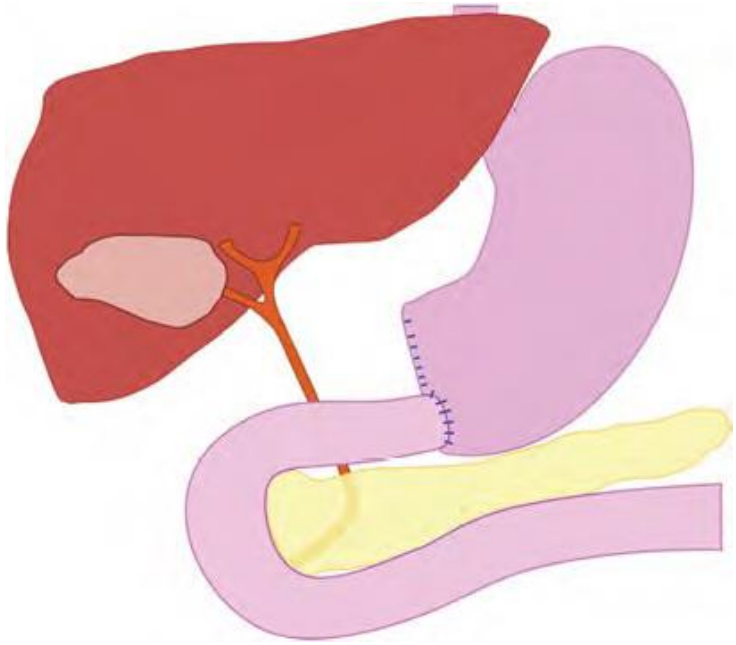
- Subtotal resection with gastroduodenal anastomosis
- 22nd January, 1881
- Theodor Billroth in Vienna

- Sixteen years later
- 1897 in Zurich
- Karl Schlatter performed the first total gastrectomy

Fig. 2. Theodore Billroth (1829–94) during an operation at the Allgemeine Krankenhaus in Vienna

Therese Heller, 43 year
GOO due to pylorus cancer

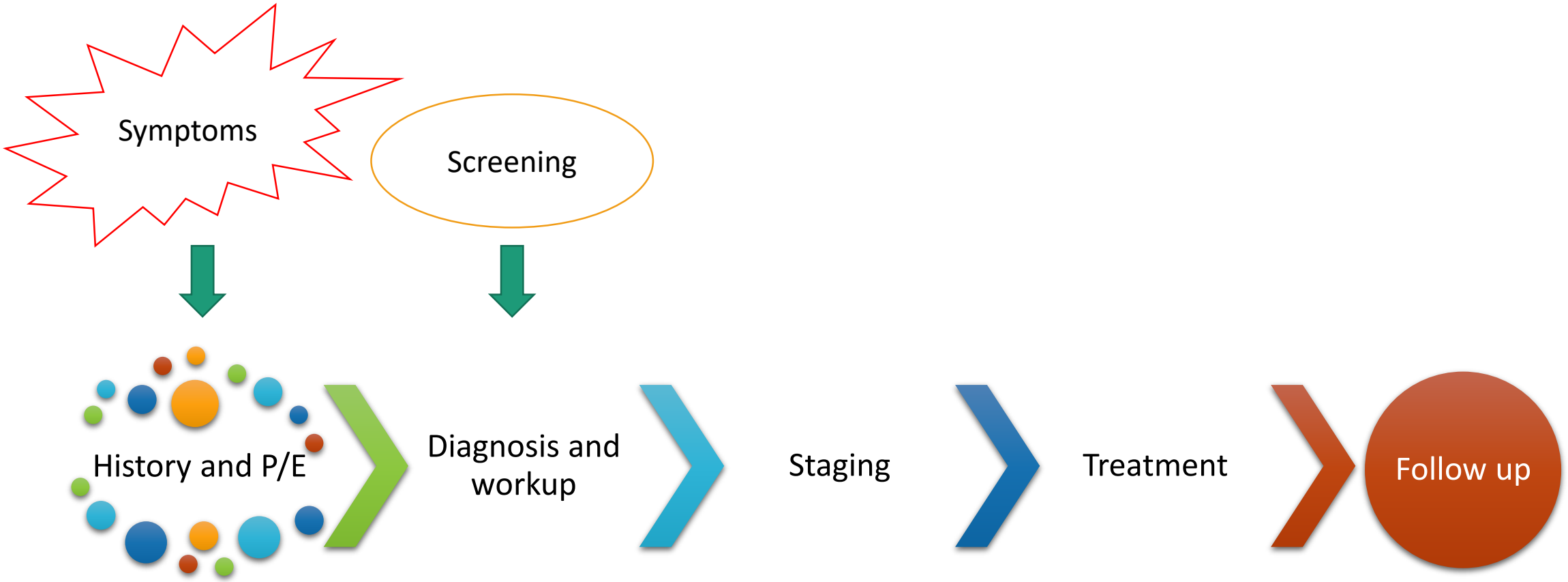
1881



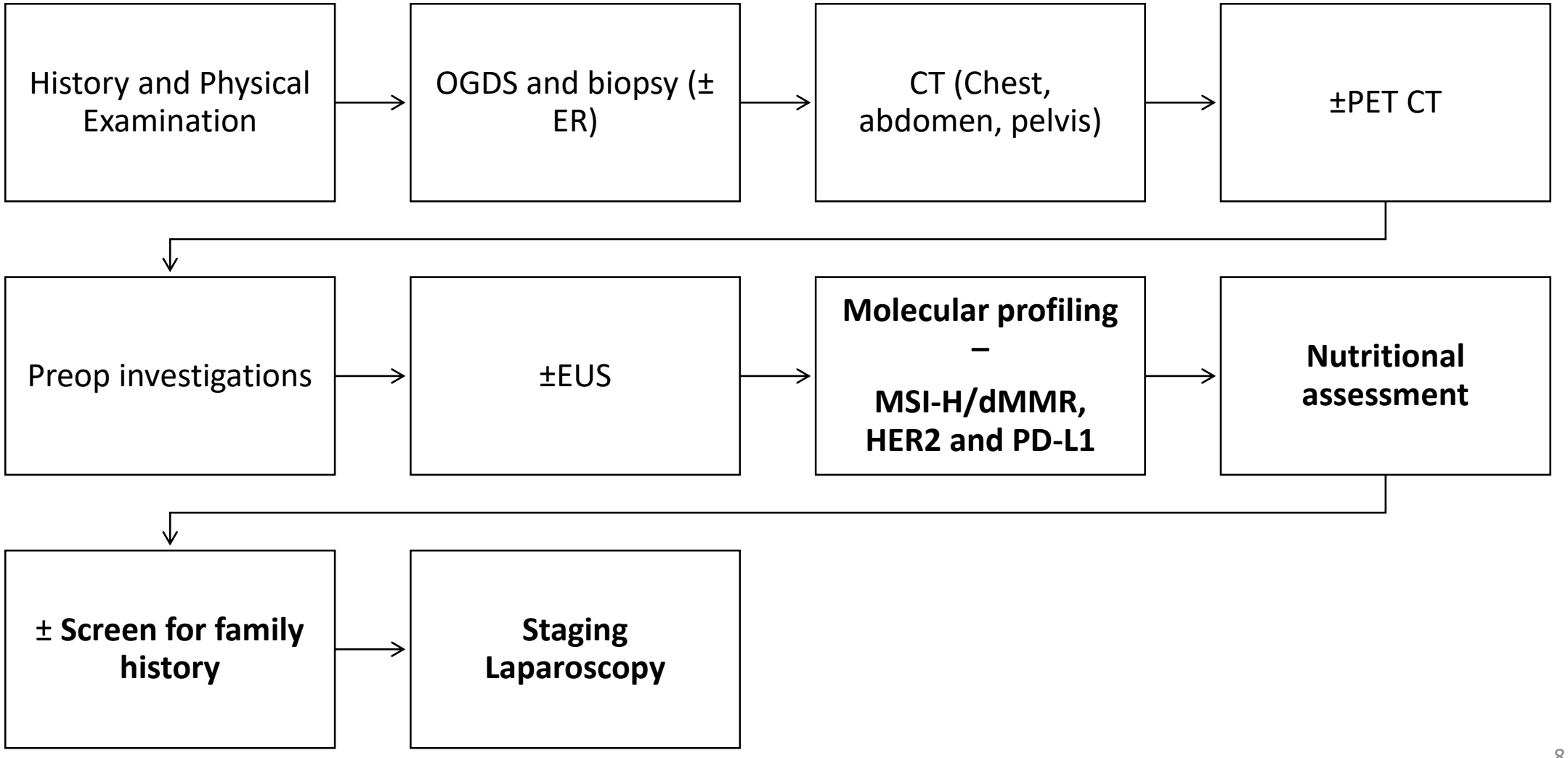
Billroth I procedure

Post-mortem specimen of stomach of the patient with the first successful gastric resection by Billroth on January 22, 1881

Management of Patients with GC

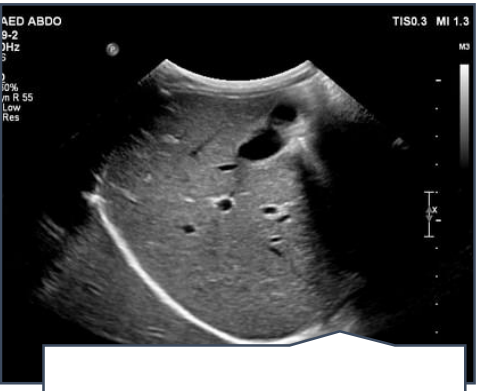


Workup


History and Physical Examination
OGDS and biopsy (± ER)
CT (Chest, abdomen, pelvis)
±PET CT
Preop investigations
±EUS
Molecular profiling – MSI-H/dMMR, HER2 and PD-L1
Nutritional assessment
± Screen for family history
Staging Laparoscopy

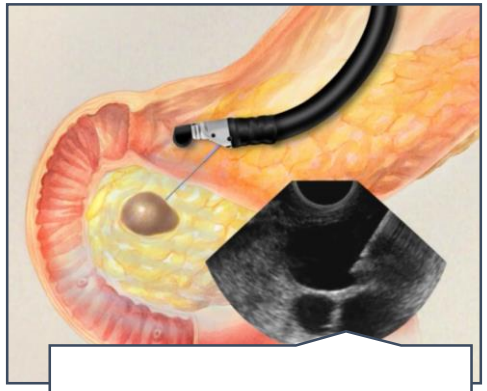
Clinical Staging of Gastric Carcinoma

Staging Investigations

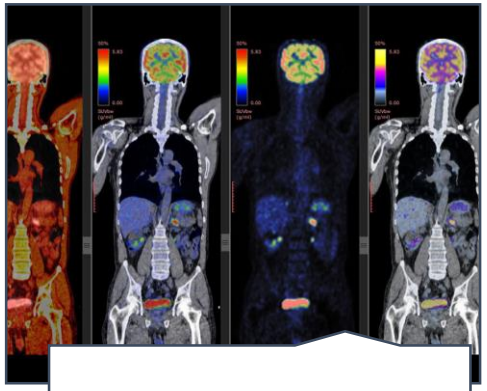


USG

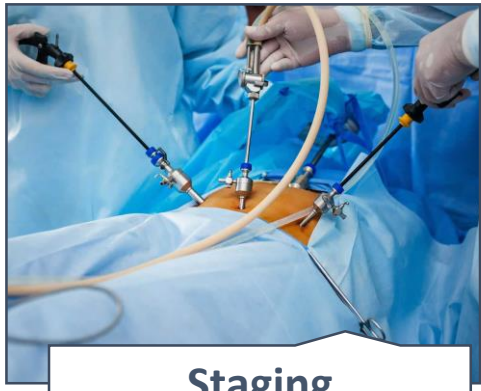
CT



EUS



PET CT



Staging Laparoscopy

Staging Laparoscopy

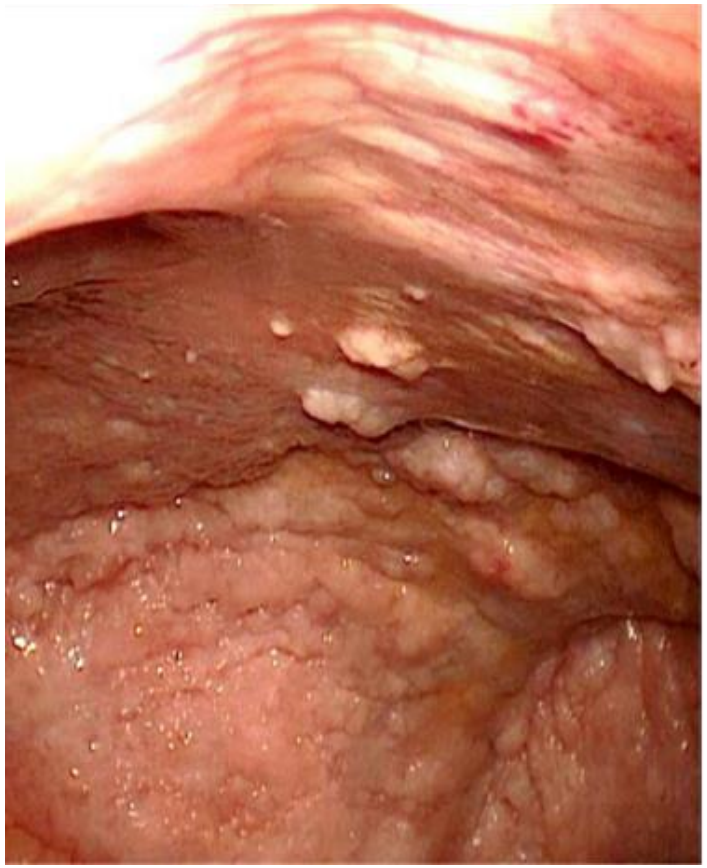
- Diagnosis of **peritoneal dissemination** and **extra-serosal invasion,**
- The ability to perform peritoneal **lavage for cytology**
- Indications for SL

  (1) endoscopic or CT findings suggesting extra serosal invasion,

  (2) scirrhous gastric cancer, which tends to disseminate throughout the peritoneum,

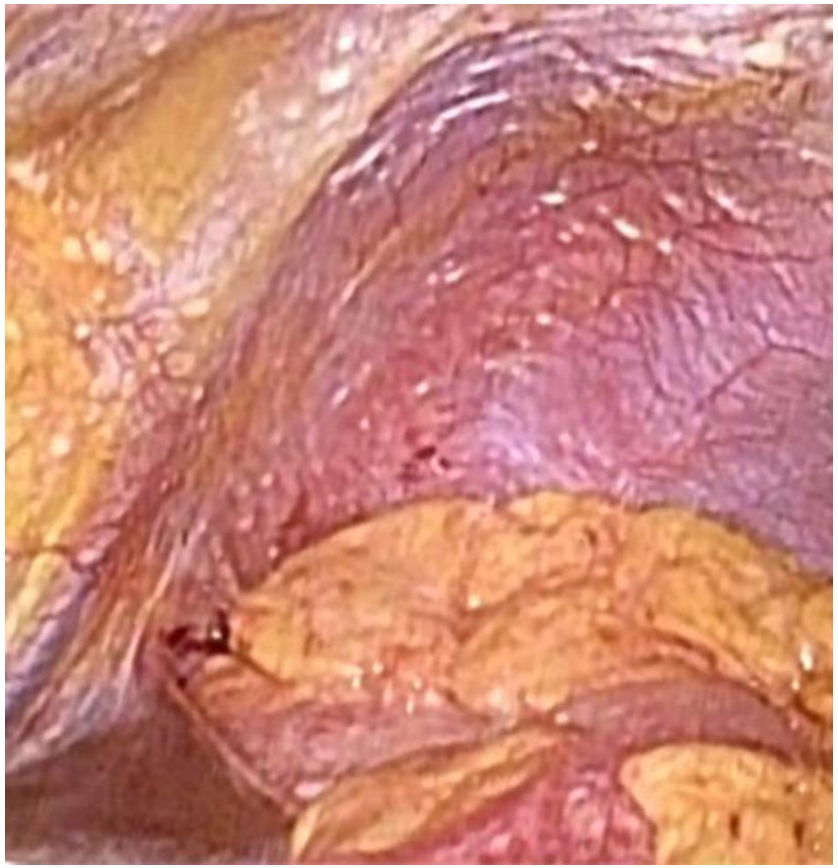
  (3) findings suggesting peritoneal dissemination or a small amount of ascites

  (4) indications for neoadjuvant chemotherapy.



Staging Laparoscopy

- Staging laparoscopy with peritoneal washings is a **critical component of the initial workup**
- Considered standard in many centers
- **Carcinomatosis in 20%** of pts without imaging evidence
- **Positive cytology in 10%** of pts
- Usually done as out-patient procedure as one of the initial staging investigation



Staging of Gastric Cancer

Clinical Staging (cTNM)

	cT	cN	M
Stage 0	Tis	N0	M0
Stage I	T1	N0	M0
	T2	N0	M0
Stage IIA	T1	N1, N2, N3	M0
	T2	N1, N2, N3	M0
Stage IIB	T3	N0	M0
	T4a	N0	M0
Stage III	T3	N1, N2, N3	M0
	T4a	N1, N2, N3	M0
Stage IVA	T4b	Any N	M0
Stage IVB	Any T	Any N	M1

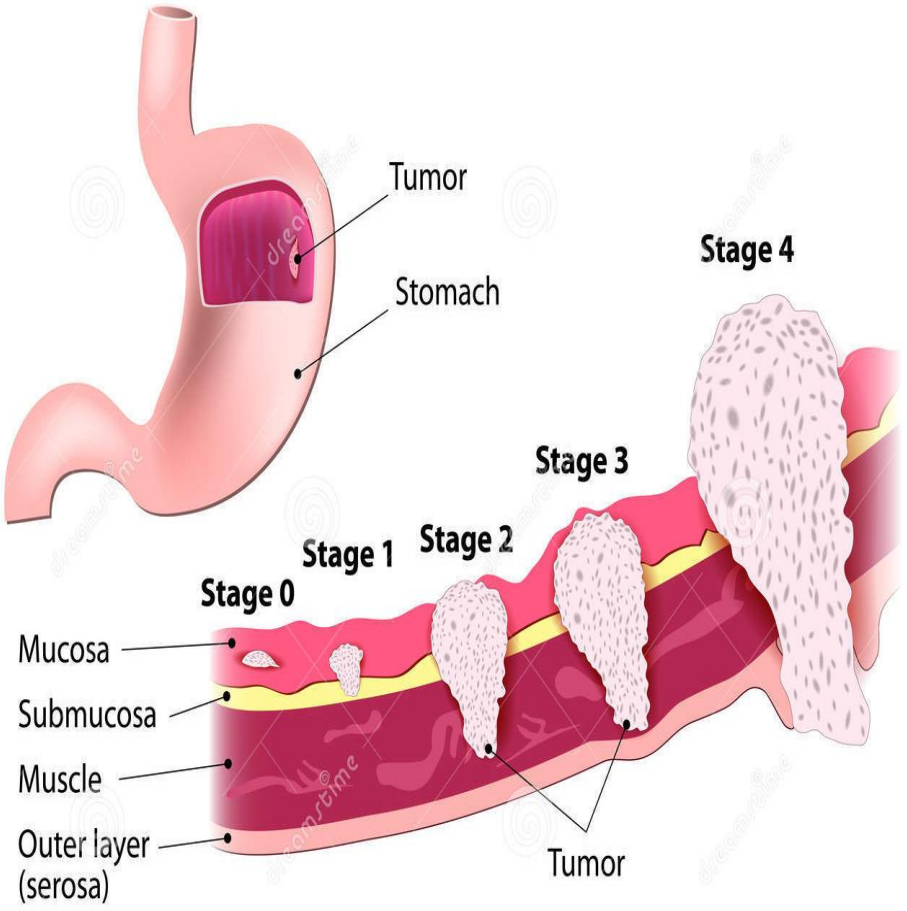
AJCC Cancer staging Manual 8th Edition
Staging of Gastric Cancer

Table 1. **Definitions for T, N, M**

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, high-grade dysplasia
T1	Tumor invades the lamina propria, muscularis mucosae, or submucosa
T1a	Tumor invades the lamina propria or muscularis mucosae
T1b	Tumor invades the submucosa
T2	Tumor invades the muscularis propria*
T3	Tumor penetrates the subserosal connective tissue without invasion of the visceral peritoneum or adjacent structures**,***
T4	Tumor invades the serosa (visceral peritoneum) or adjacent structures**,***
T4a	Tumor invades the serosa (visceral peritoneum)
T4b	Tumor invades adjacent structures/organs

EGC

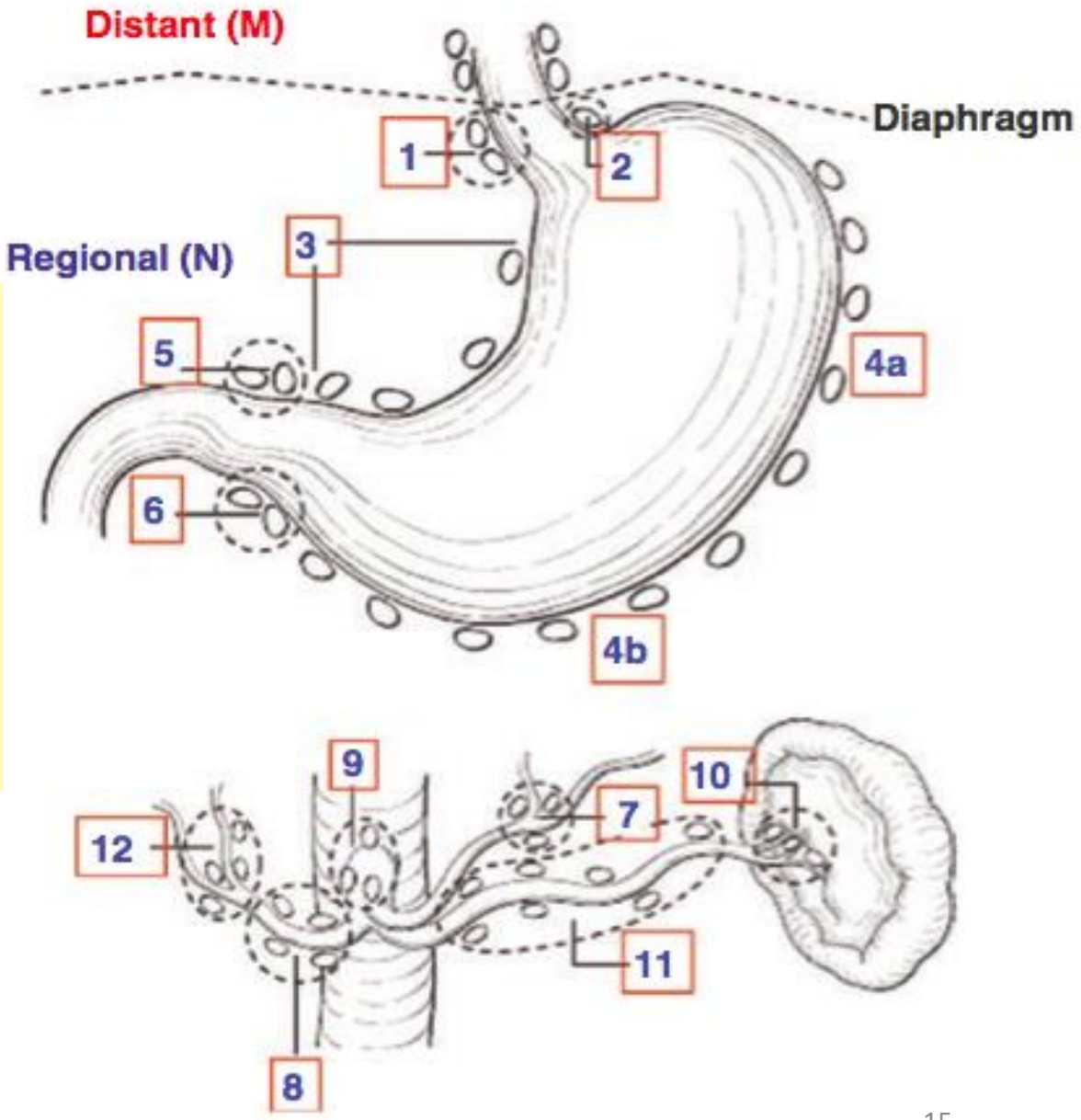
AGC



N stage

Regional Lymph Nodes (N)

NX	Regional lymph node(s) cannot be assessed
N0	No regional lymph node metastasis*
N1	Metastasis in 1–2 regional lymph nodes
N2	Metastasis in 3–6 regional lymph nodes
N3	Metastasis in seven or more regional lymph nodes
N3a	Metastasis in 7–15 regional lymph nodes
N3b	Metastasis in 16 or more regional lymph nodes



Treatment of gastric cancer ….

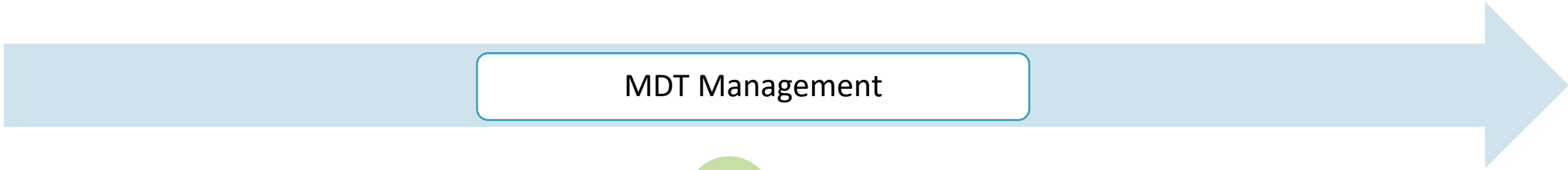
Patient's Condition

Staging of GC

Expertise

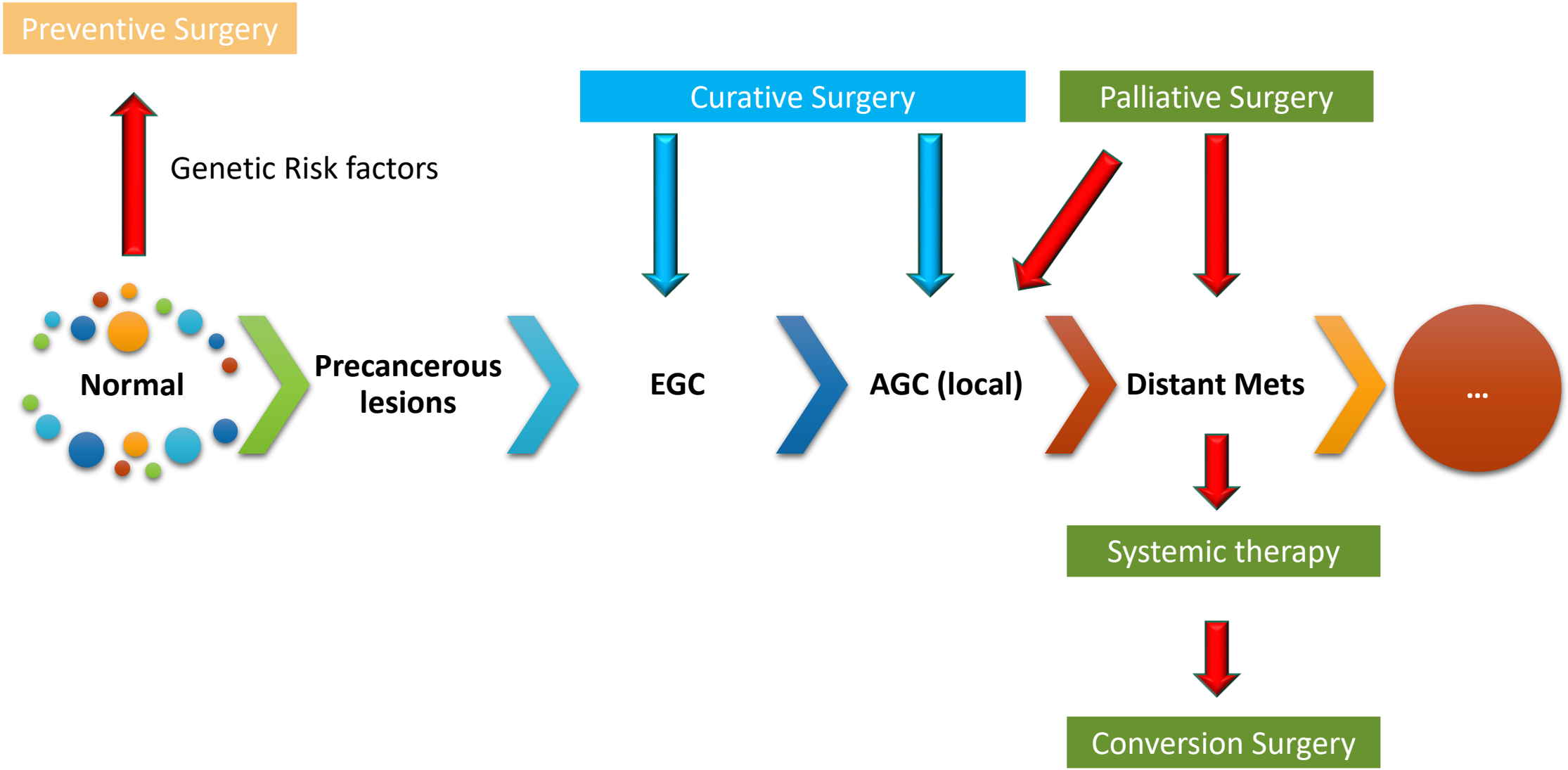
MDT

Facilities



- Surgery
- ± Neoadjuvant
- Systemic/adjuvant therapy
- Palliative therapies

Role of Surgery in Gastric Cancer



Treatment Guidelines for Gastric Cancer

Guidelines


Japanese Guideline JGCA


Korean Guideline KGCA


Chinese Guideline CSCO


ESMO Guideline


NCCN Guideline


NICE Guideline

Japanese Gastric Cancer Treatment Guideline (2021)

Gastric Cancer (2023) 26:1–25
https://doi.org/10.1007/s10120-022-01331-8

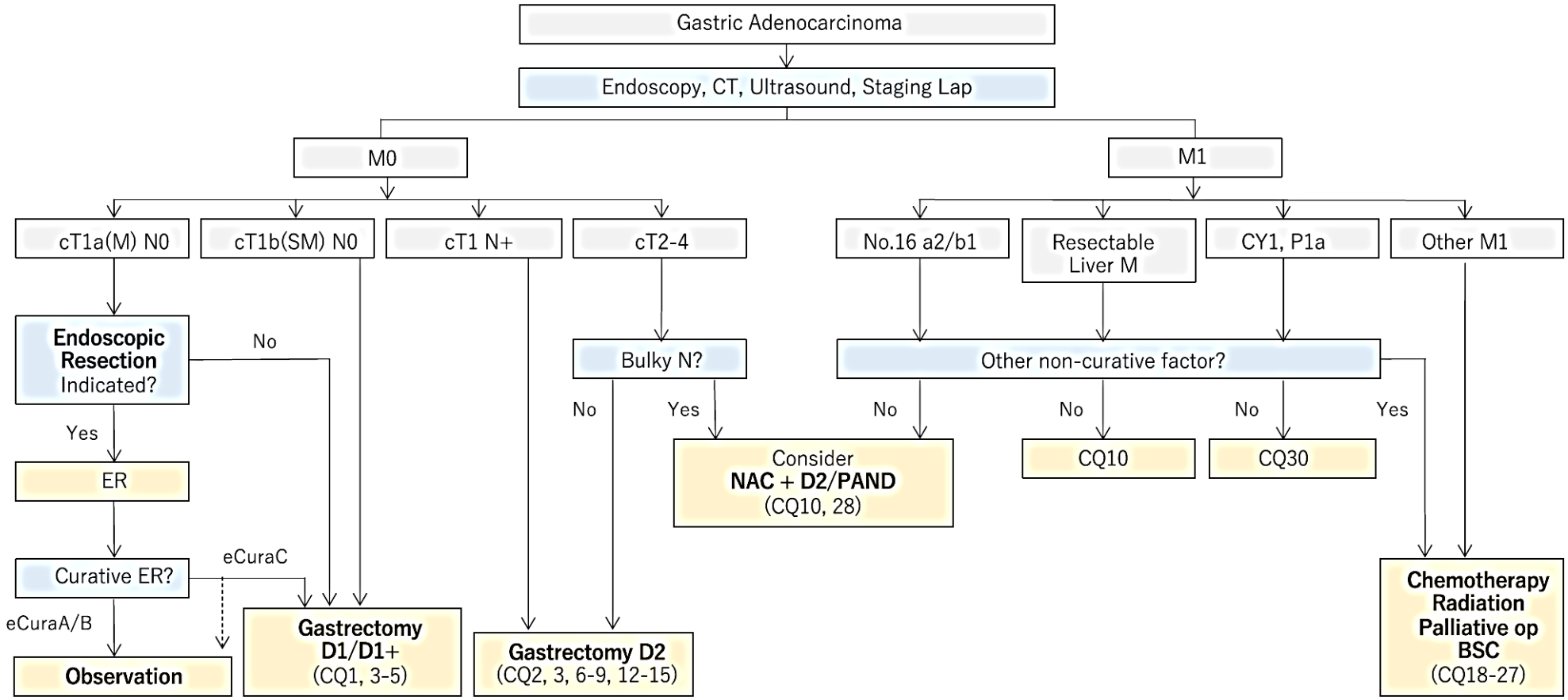
SPECIAL ARTICLE

Japanese Gastric Cancer Treatment Guidelines 2021 (6th edition)

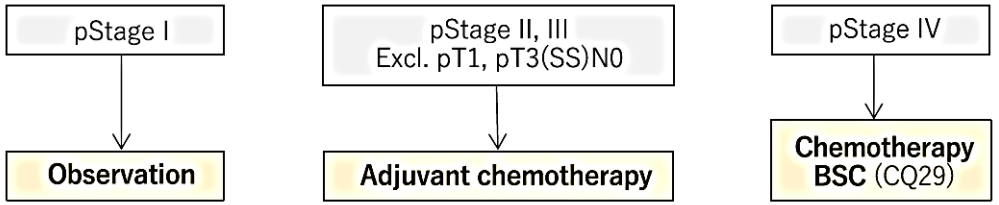
Japanese Gastric Cancer Association[1]

Received: 13 July 2022 / Accepted: 3 August 2022 / Published online: 7 November 2022

Japanese Gastric Cancer Treatment Guideline (2021)

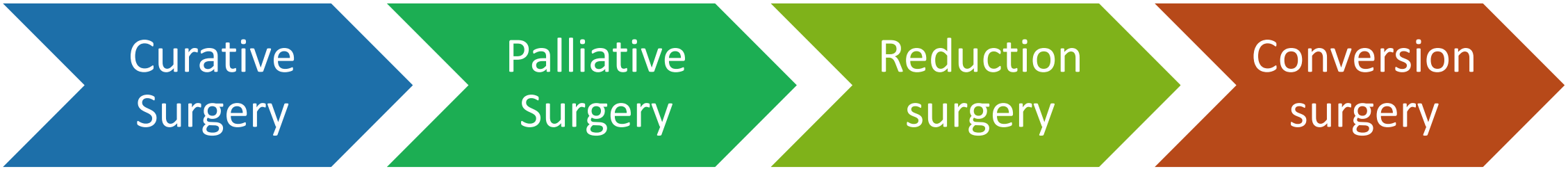


After gastrectomy



Surgery for Gastric Cancer

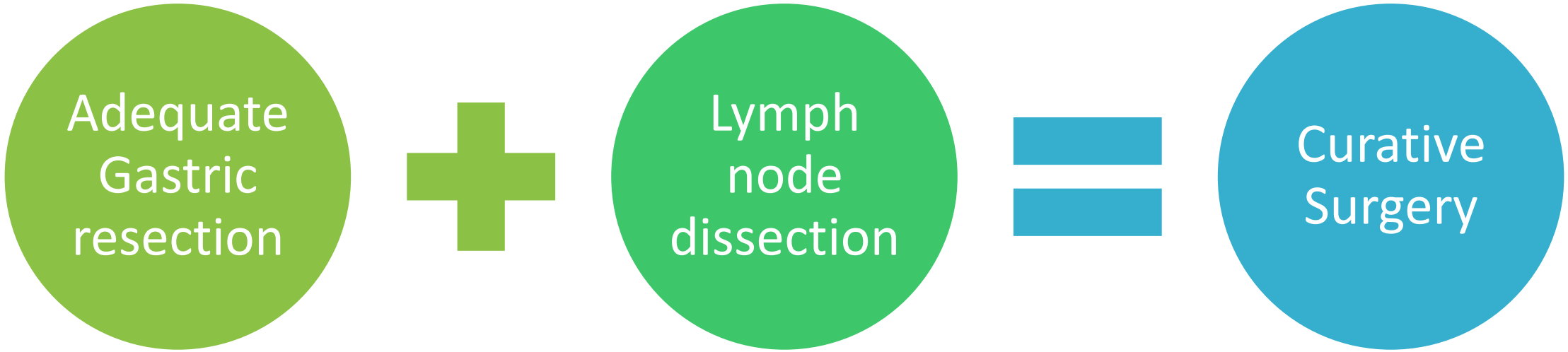
Surgical intents



- To achieve R0 resection
- For palliation

Japanese Gastric Cancer Association, 2016. Japanese gastric cancer treatment guidelines 2014 (ver. 4). *Gastric Cancer,* pp. 1-19.

Curative intents



Curative Surgery

Nomenclature

Standard gastrectomy

- at least two-thirds of the stomach + D2 lymph node dissection.

Non-standard gastrectomy

- the extent of gastric resection and/or lymphadenectomy is altered according to tumor stages.

Modified Surgery

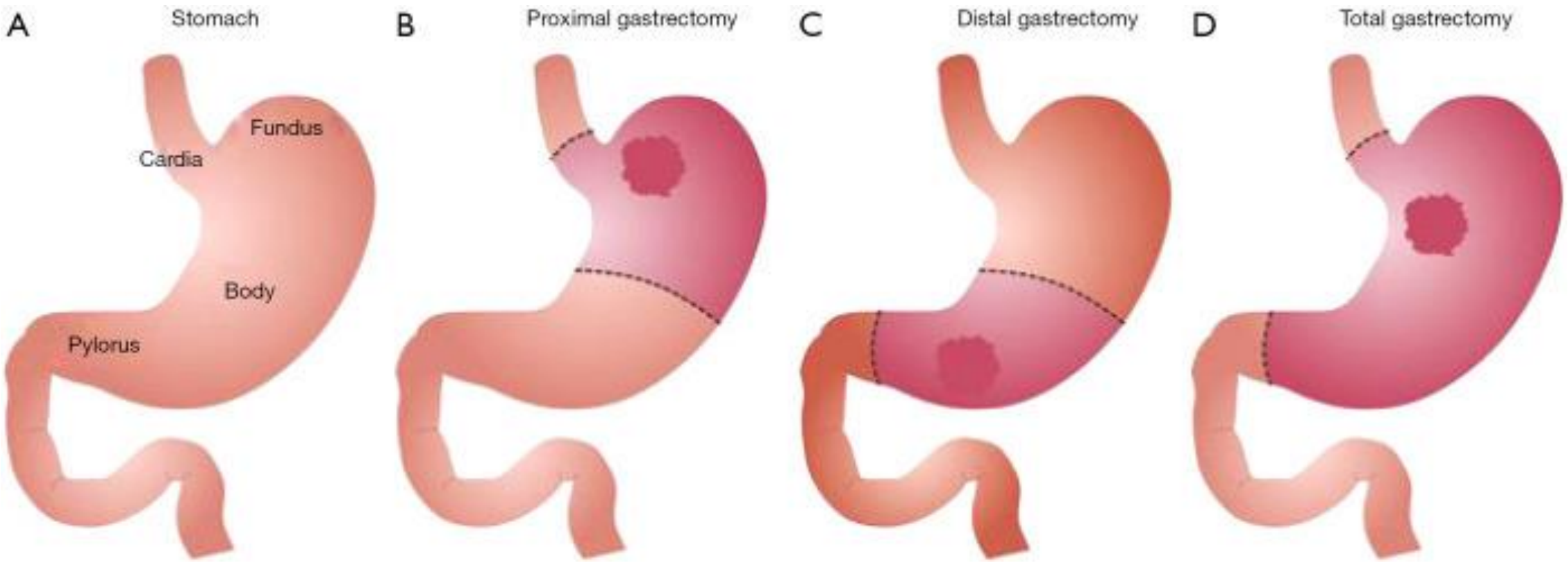
- The extent of gastric resection and/or lymphadenectomy is reduced (D1, D1+, etc.) compared to standard surgery.

Function preserving surgery

Extended Surgery

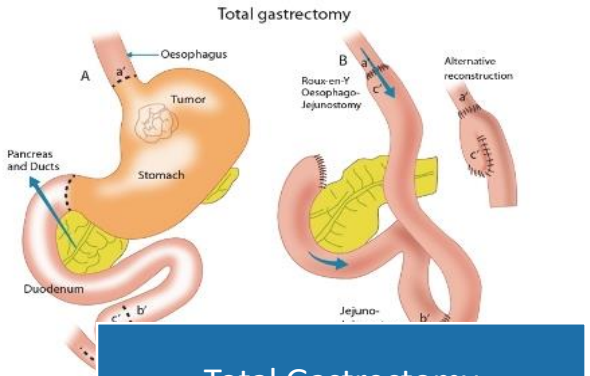
- (1)Gastrectomy with combined resection of adjacent involved organs.
- (2) Gastrectomy with extended lymphadenectomy exceeding D2.

Extent of Gastric Resection



Types of Gastrectomy

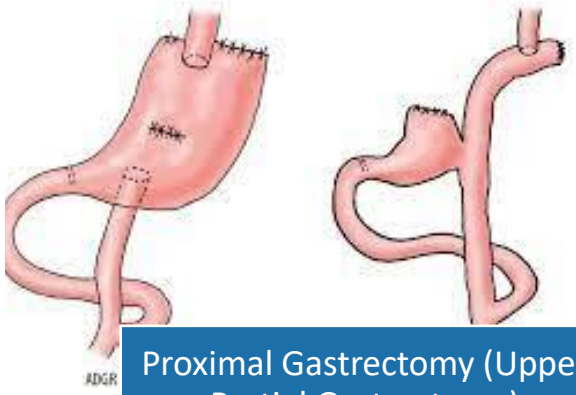
- Surgery for gastric cancer differ according to the stomach volume to be resected.



Total Gastrectomy

Distal Gastrectomy (Partial Gastrectomy

Pylorus-preserving Gastrectomy (PPG)



Proximal Gastrectomy (Upper Partial Gastrectomy)

Segmental resection

Recommended Resection Margin

- T2 or Deeper tumor : A proximal margin of at least 3 cm
- 5 cm for those with an infiltrative growth pattern (types 3 and 4).
- For tumors invading the esophagus, a resection margin>5 cm is not necessarily required, but frozen section examination of the resection line is preferable to ensure an R0 resection.
- T1 tumors: resection margin 2 cm

LN Dissection in Gastric Cancer Surgery

The extent of lymphadenectomy is classified by the D-level criteria into D1, D1+, or D2, and is defined according to the type of gastrectomy conducted.

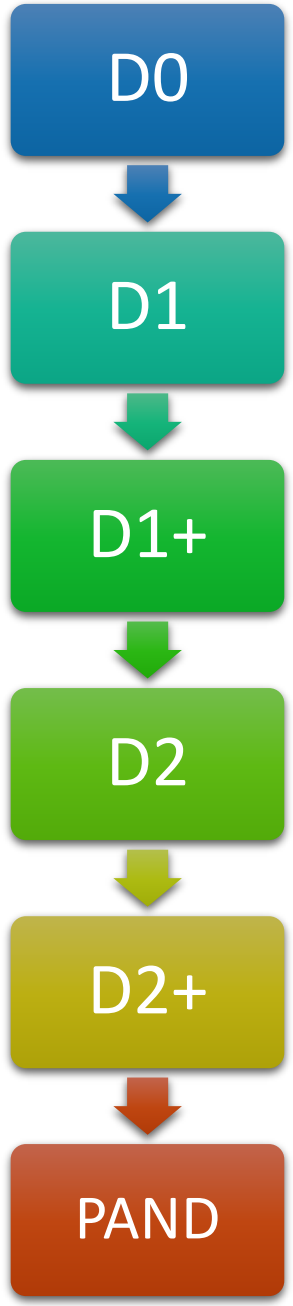
LN dissection in GC surgery

- Advocated by Kajitani

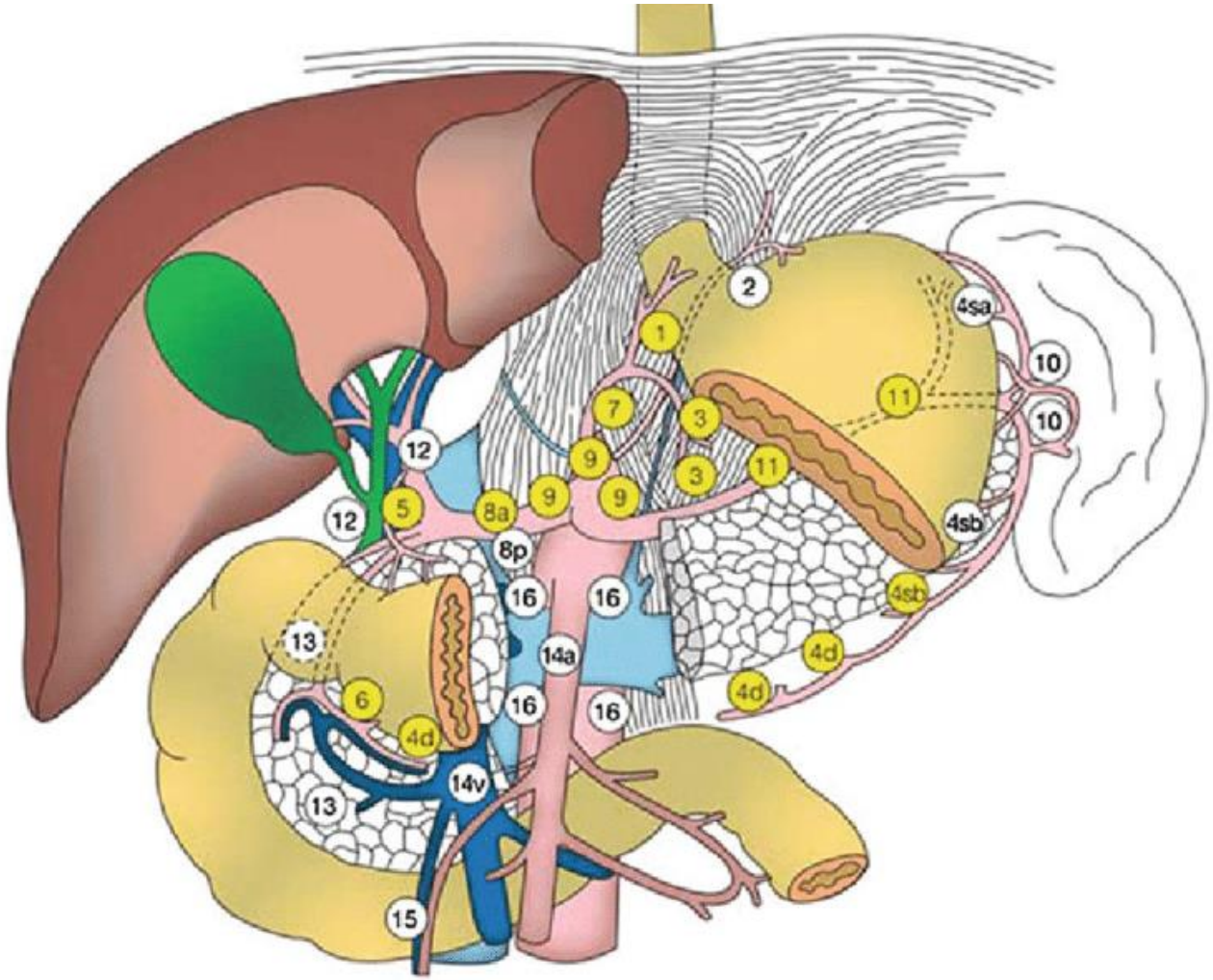
1942

- **D2 dissection – the standard procedure of radical gastrectomy for local AGC in Japan**

1961

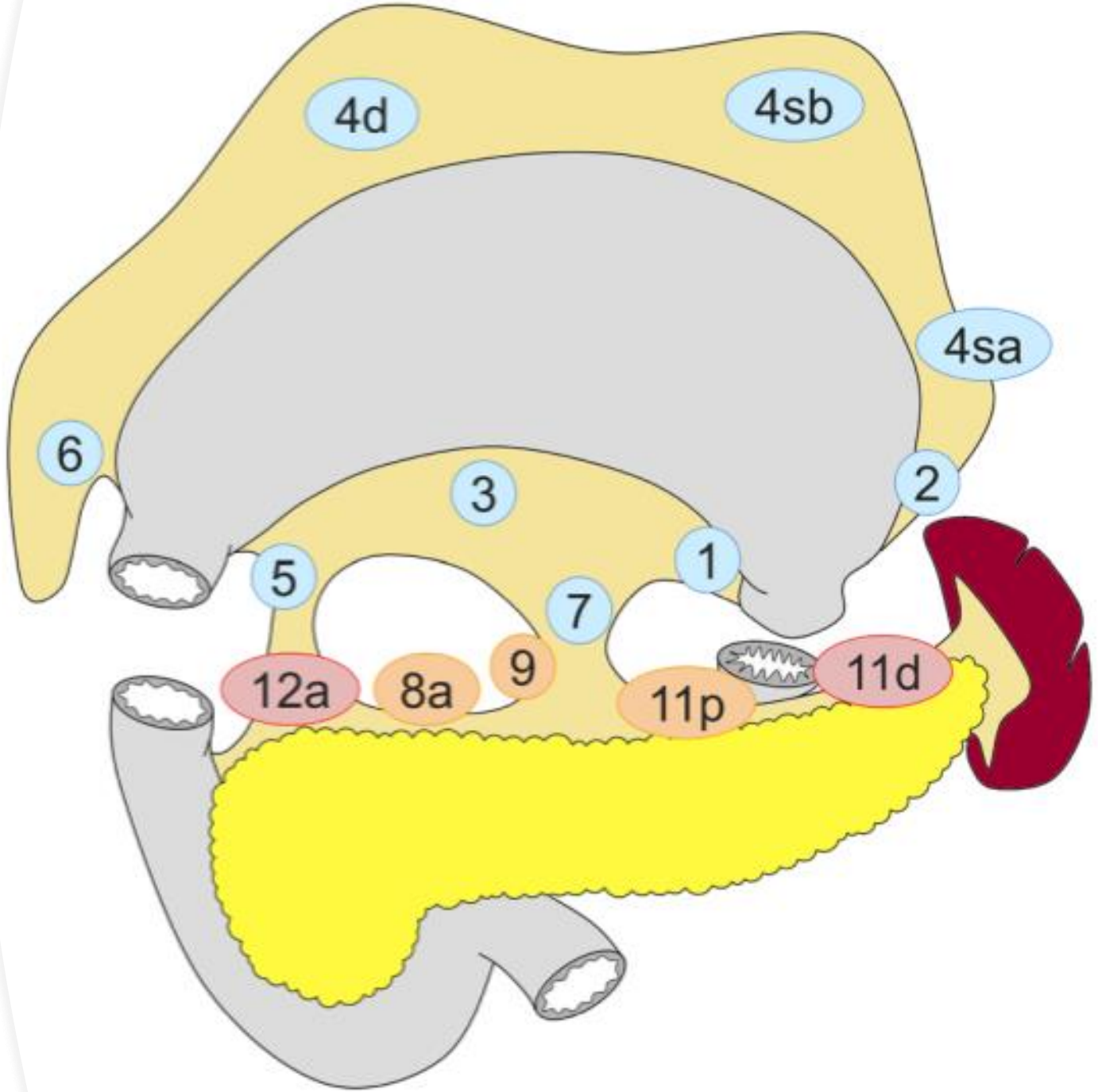


LN Stations


2
4sa
1
10
11
7
3
10
12
9
3
11
9
9
12
5
8a
4sb
8p
16
16
4sb
13
14a
4d
4d
6
16
16
4d
14v
13
15

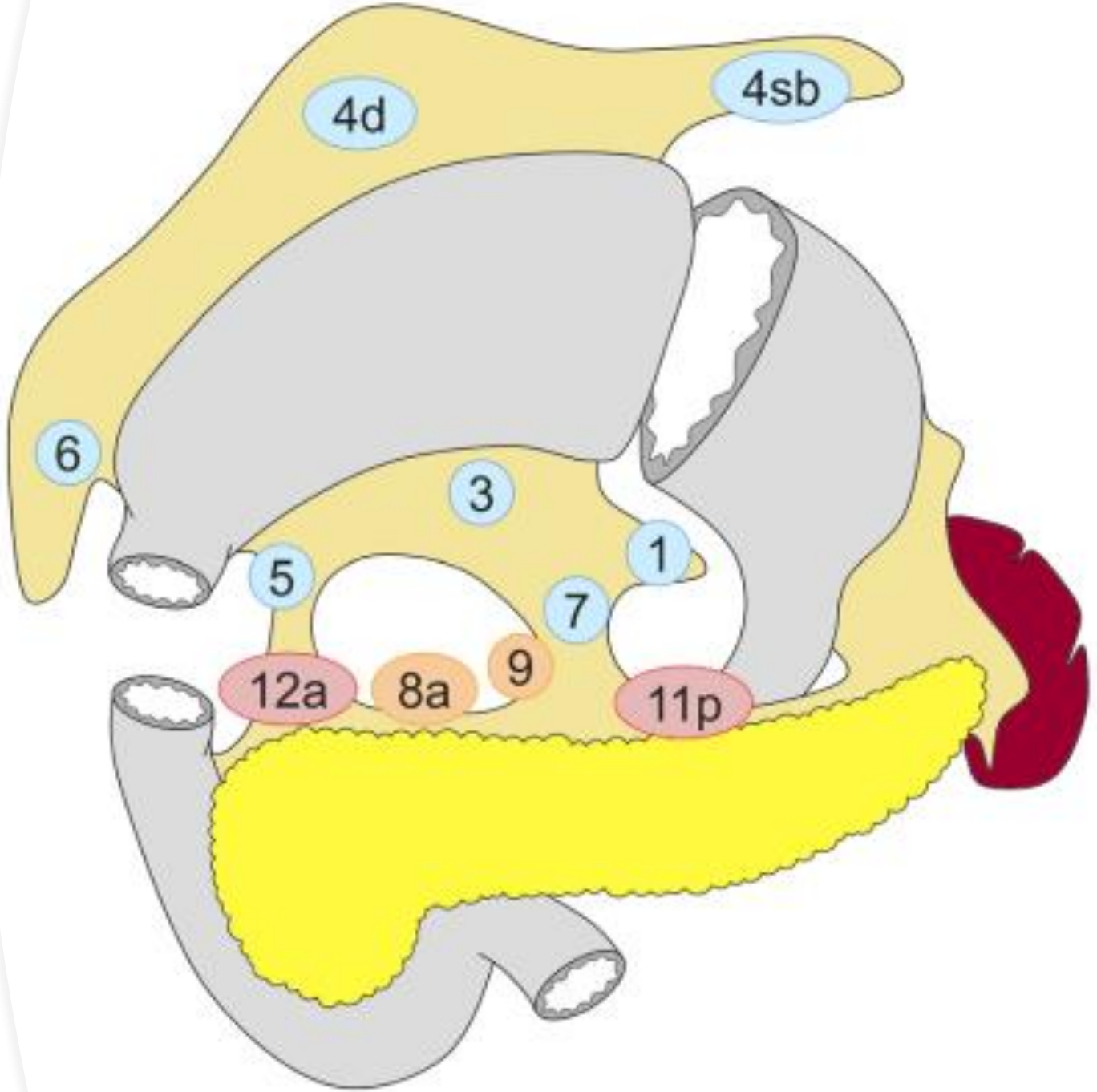
Total Gastrectomy

- **D0**: lymphadenectomy less than D1.
- **D1**: Nos. 1–7.
- **D1**+: D1+Nos. 8a, 9, 11p.
- **D2**: D1+Nos. 8a, 9, 11p, 11d, 12a.

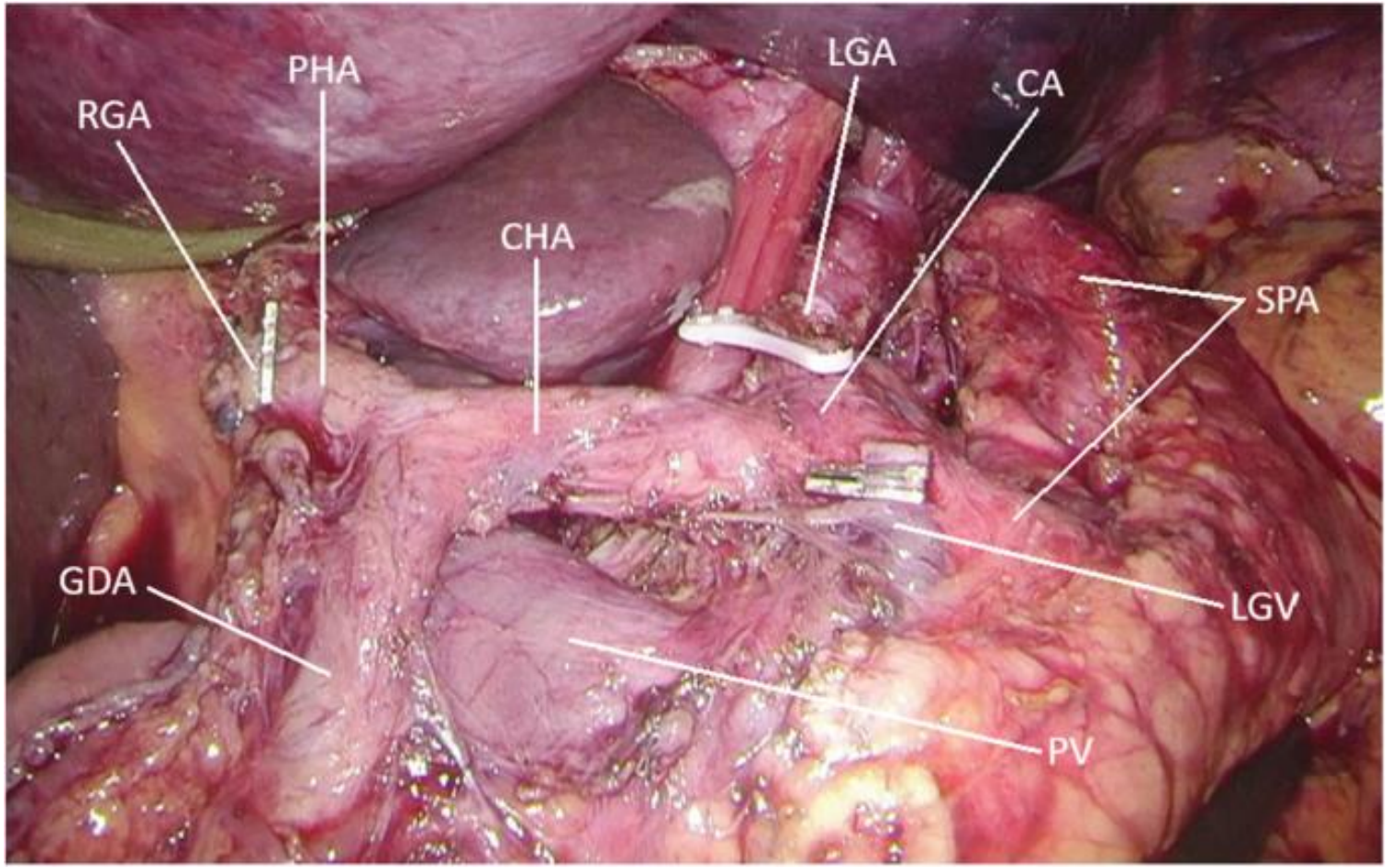


Distal Gastrectomy

- **D0**: lymphadenectomy less than D1.
- **D1**: Nos. 1, 3, 4sb, 4d, 5, 6, 7.
- **D1+**: D1 + Nos. 8a, 9.
- **D2**: D1 + Nos. 8a, 9, 11p, 12a



D2 LN dissection

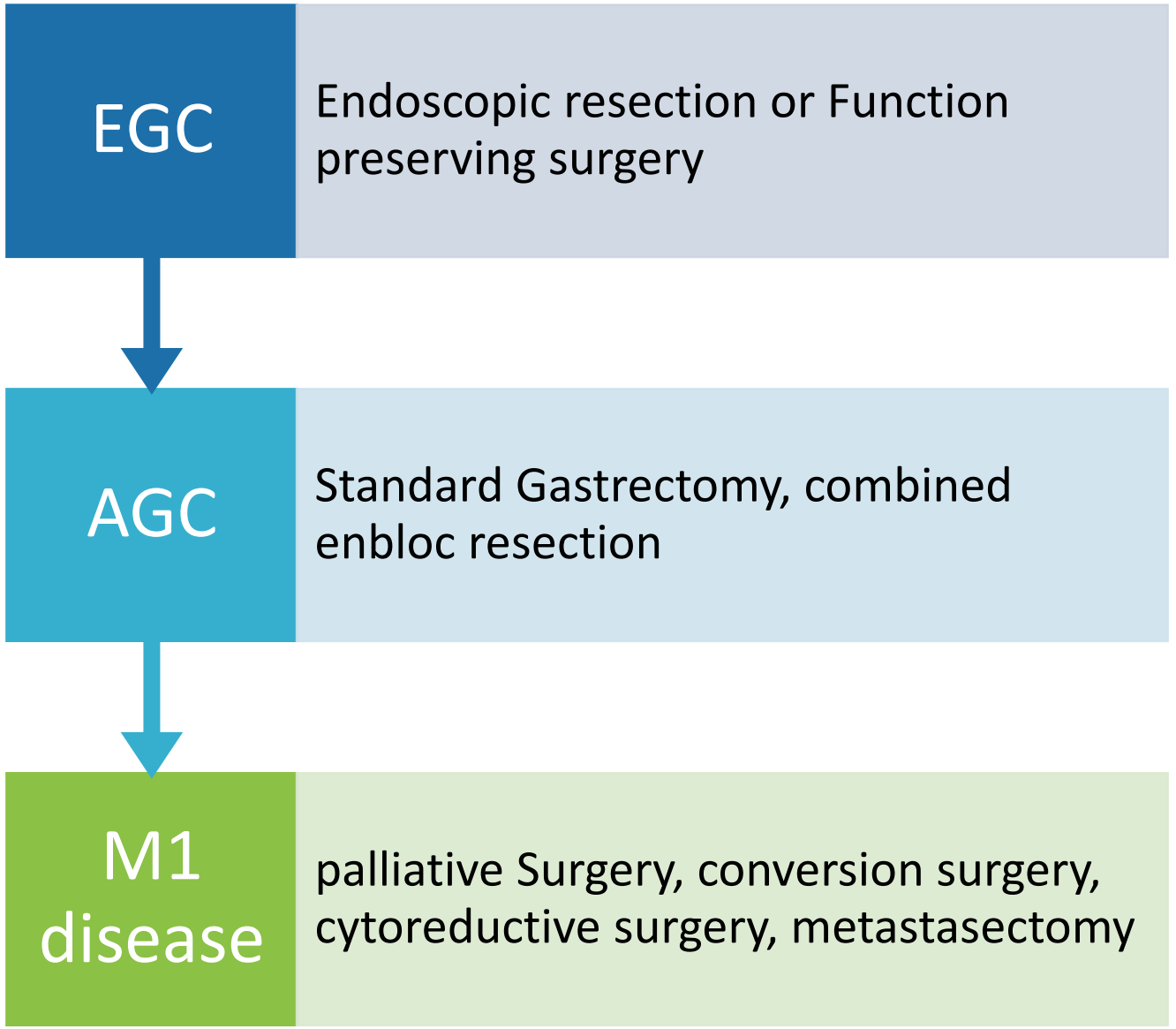


Tsekrekos, A., Triantafyllou, T., Klevebro, F. *et al.* Implementation of minimally invasive gastrectomy for gastric cancer in a western tertiary referral center. *BMC Surg* **20**, 157 (2020). https://doi.org/10.1186/s12893-020-00812-w

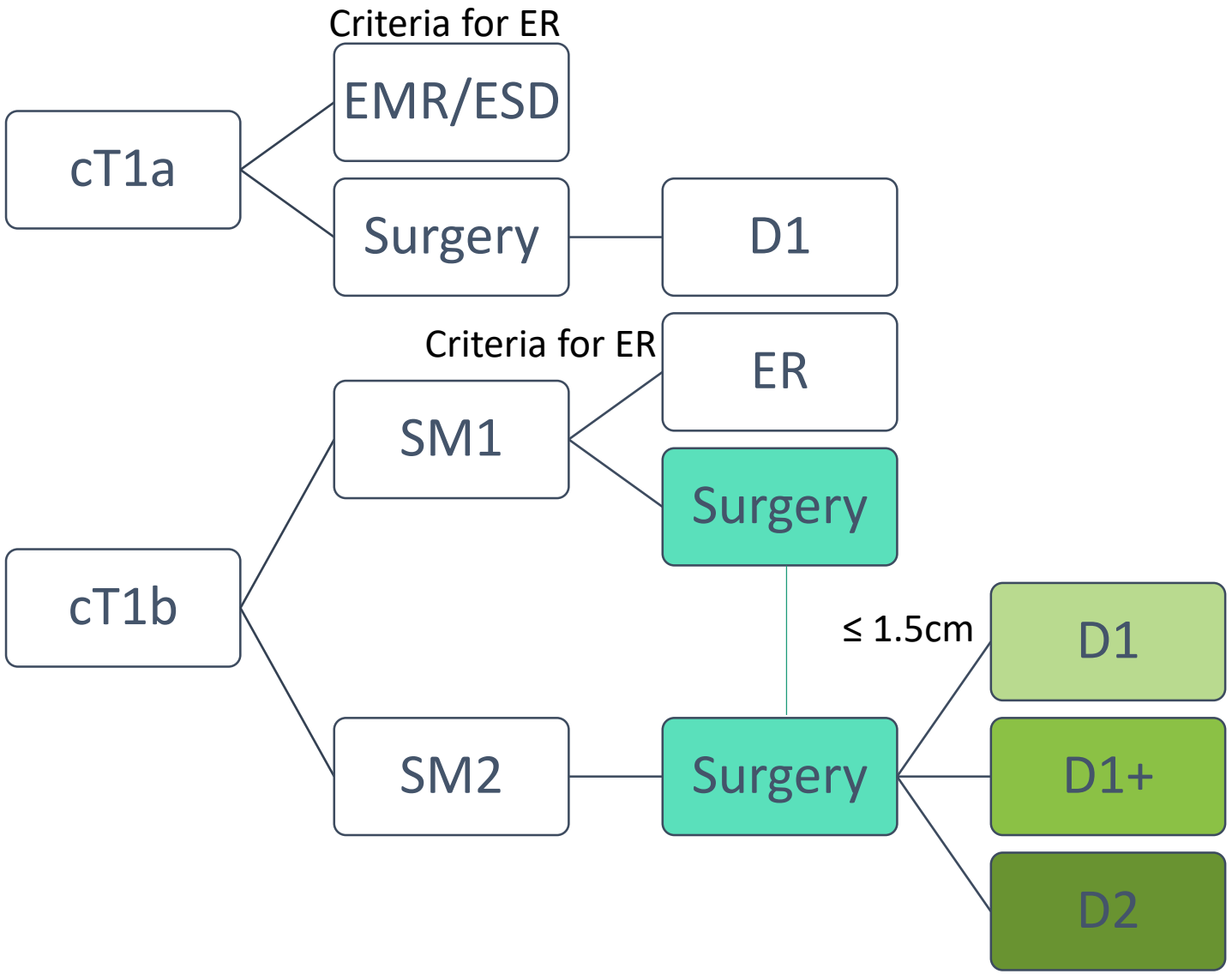
D2+ Lymphadenectomy (Extended)

D2 + No.10	D2 + No.14v	D2 + No.13	D2 + No.16
• For proximal cancer invading greater curvature	• For distal cancer with No.6 nodes metastasis	• For cancer invading duodenum	• Can be done after NAC for cancer with extensive LN involvement

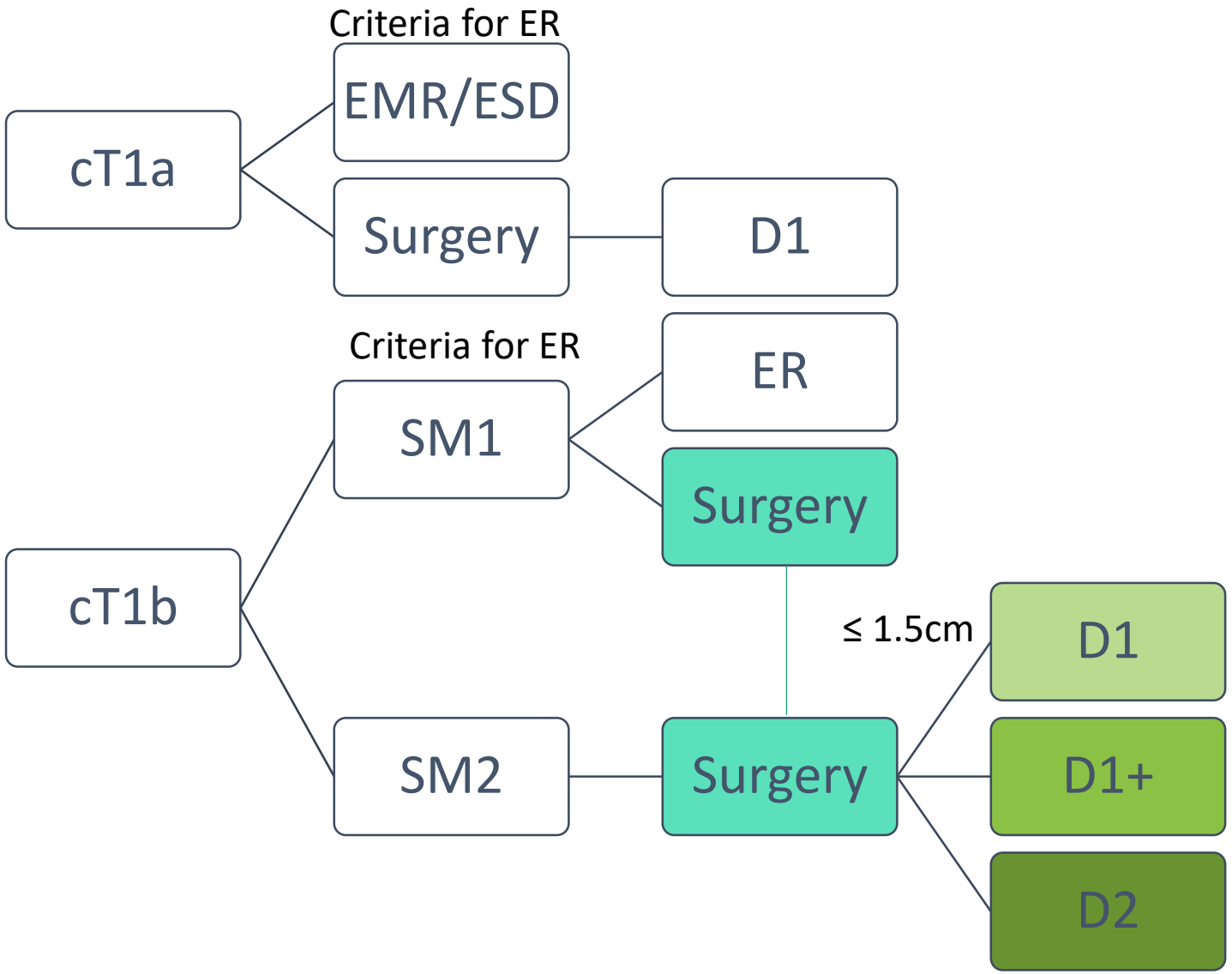
Surgical Treatment (according to clinical stage)



EGC (cTis, cT1a, cT1b) N0



EGC (cTis, cT1a, cT1b) N0

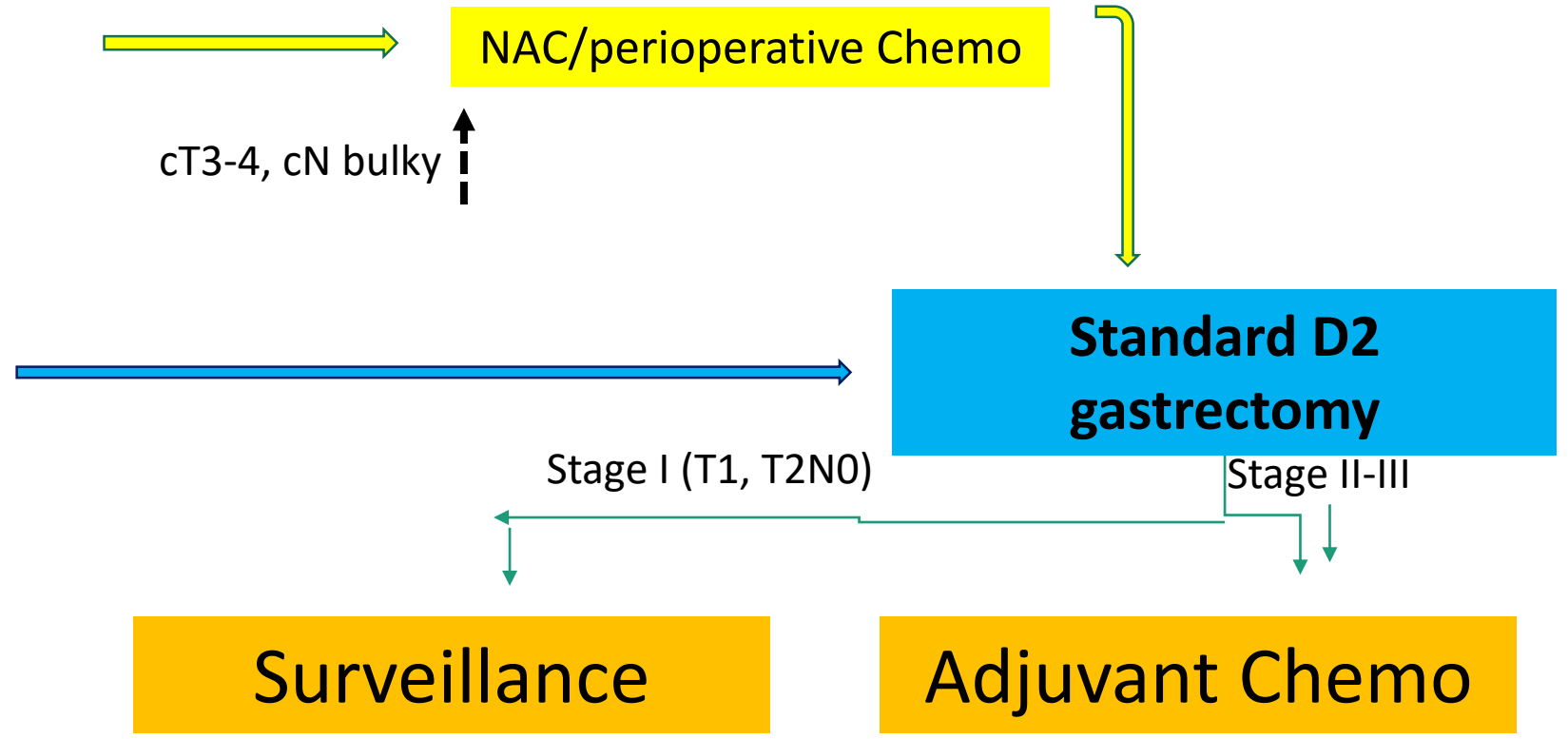


- **Function preserving surgery is usually considered in EGC**
  - **Pylorus preserving gastrectomy**
  - **Proximal gastrectomy**

Locoregional cancers (cT1b – cT4a, M0)

Table 2. **AJCC Prognostic Stage Groups**
Clinical Staging (cTNM)

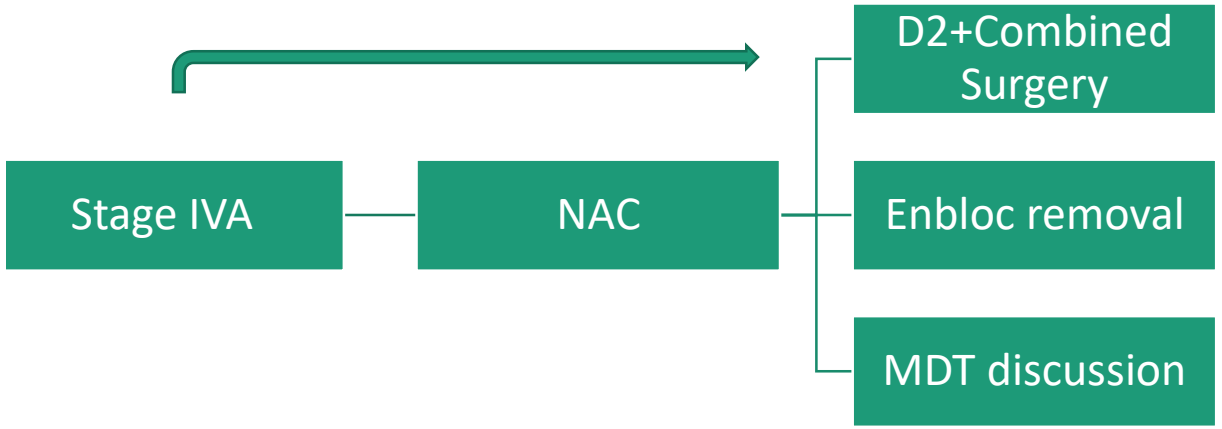
	cT	cN	M
Stage 0	Tis	N0	M0
Stage I	T1	N0	M0
	T2	N0	M0
Stage IIA	T1	N1, N2, N3	M0
	T2	N1, N2, N3	M0
Stage IIB	T3	N0	M0
	T4a	N0	M0
Stage III	T3	N1, N2, N3	M0
	T4a	N1, N2, N3	M0
Stage IVA	T4b	Any N	M0
Stage IVB	Any T	Any N	M1



Locoregional cancers (cT4b, cM0)

Table 2. **AJCC Prognostic Stage Groups**
Clinical Staging (cTNM)

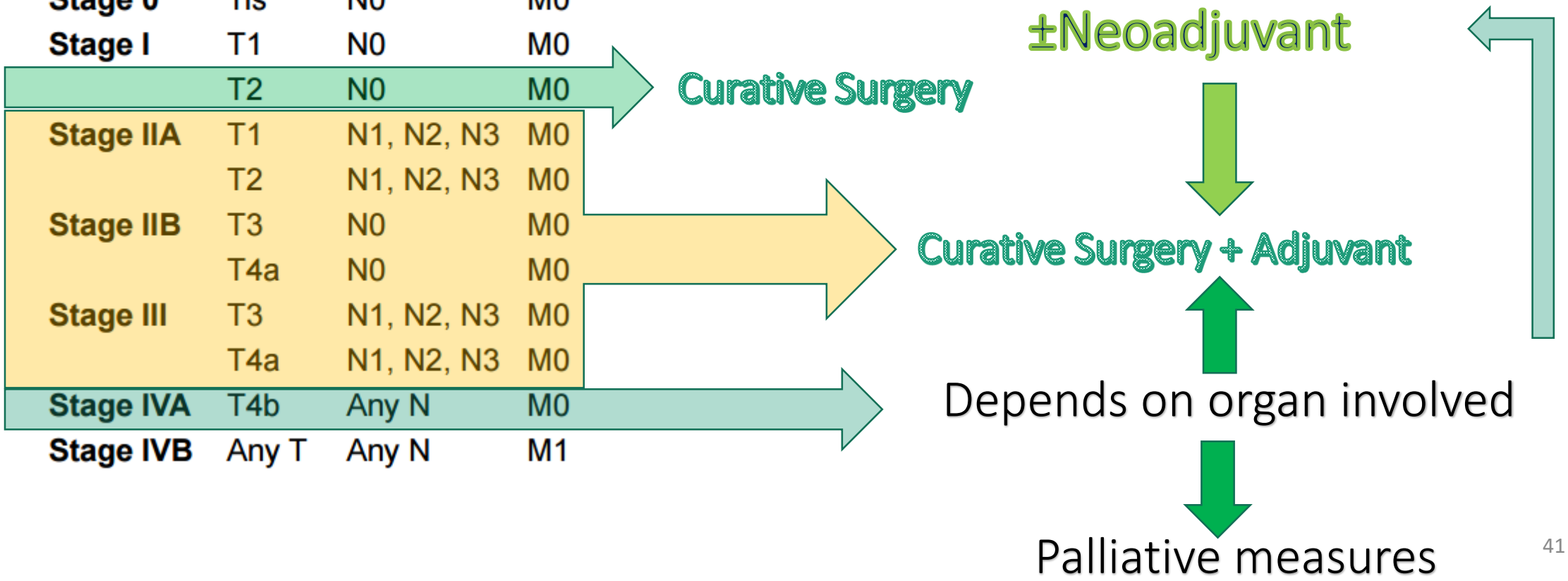
	cT	cN	M
Stage 0	Tis	N0	M0
Stage I	T1	N0	M0
	T2	N0	M0
Stage IIA	T1	N1, N2, N3	M0
	T2	N1, N2, N3	M0
Stage IIB	T3	N0	M0
	T4a	N0	M0
Stage III	T3	N1, N2, N3	M0
	T4a	N1, N2, N3	M0
Stage IVA	T4b	Any N	M0
Stage IVB	Any T	Any N	M1



Treatment for Advanced gastric cancers

Table 2. **AJCC Prognostic Stage Groups**
Clinical Staging (cTNM)

	cT	cN	M
Stage 0	Tis	N0	M0
Stage I	T1	N0	M0
	T2	N0	M0
Stage IIA	T1	N1, N2, N3	M0
	T2	N1, N2, N3	M0
Stage IIB	T3	N0	M0
	T4a	N0	M0
Stage III	T3	N1, N2, N3	M0
	T4a	N1, N2, N3	M0
Stage IVA	T4b	Any N	M0
Stage IVB	Any T	Any N	M1



Treatment for Metastatic GC

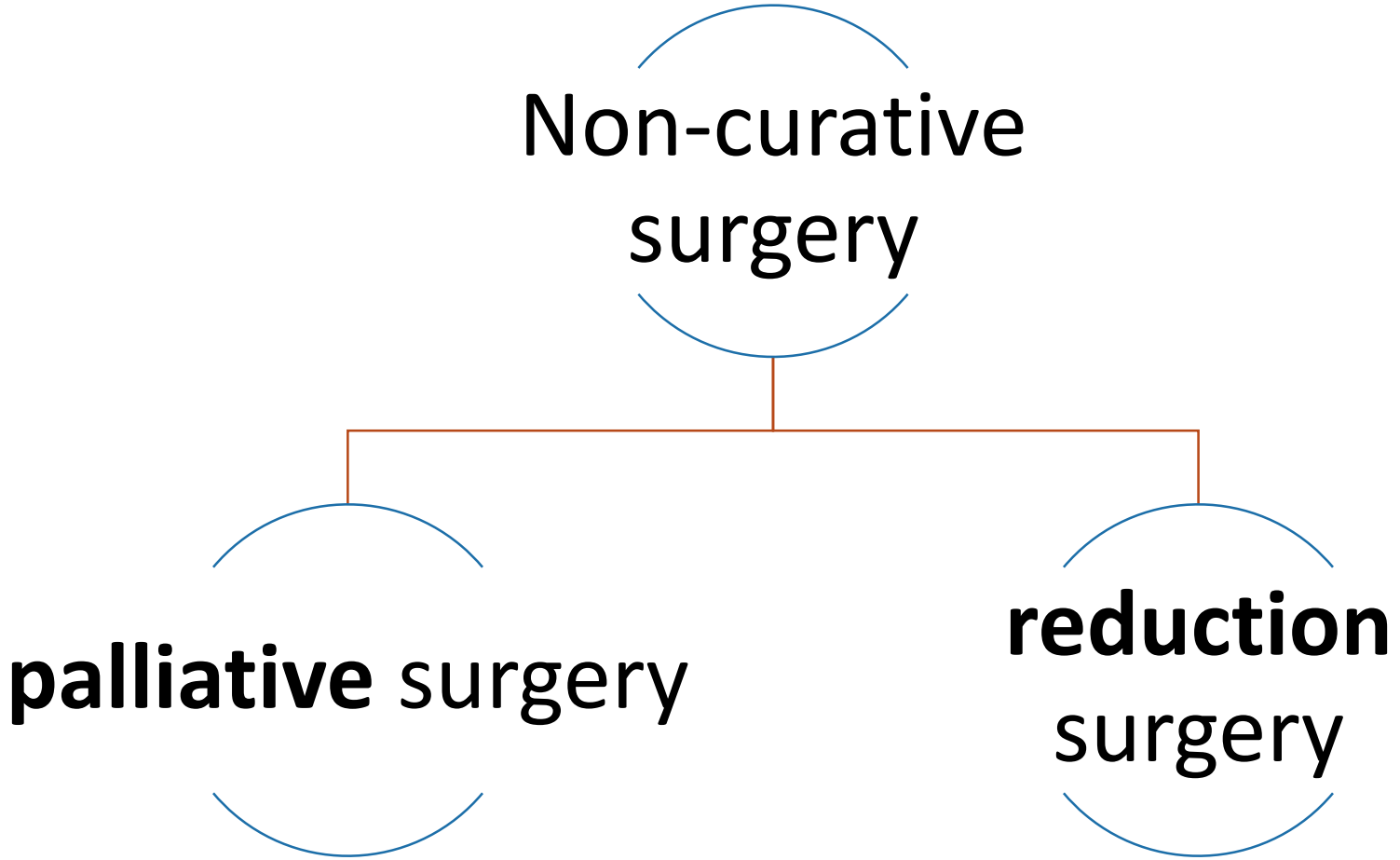
Table 2. **AJCC Prognostic Stage Groups**

Clinical Staging (cTNM)

	cT	cN	M
Stage 0	Tis	N0	M0
Stage I	T1	N0	M0
	T2	N0	M0
Stage IIA	T1	N1, N2, N3	M0
	T2	N1, N2, N3	M0
Stage IIB	T3	N0	M0
	T4a	N0	M0
Stage III	T3	N1, N2, N3	M0
	T4a	N1, N2, N3	M0
Stage IVA	T4b	Any N	M0
Stage IVB	Any T	Any N	M1

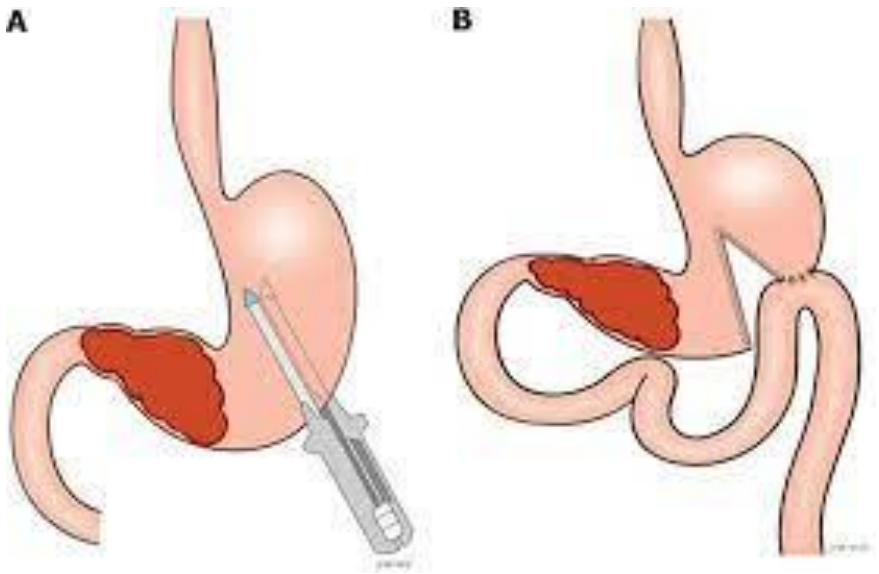
- Adjuvant CRT ± conversion therapy
- Palliative surgery
- Investigational procedures

Non-curative surgery



Palliative Surgery

- For Serious symptoms such as **bleeding** or **obstruction**
- Palliative gastrectomy or gastrojejunostomy - depending on the resectability of the primary tumor and/or surgical risks.
- To Maintain quality of life (QOL), improvement of oral intake, a good prognosis



Reduction Surgery

- Gastrectomy performed for patients with **incurable factors** such as unresectable liver metastasis and peritoneal metastasis, while suffering from **no tumor-associated symptoms** such as bleeding, obstruction, and pain.

Reduction Surgery

Clinical Trial > Lancet Oncol. 2016 Mar;17(3):309-318. doi: 10.1016/S1470-2045(15)00553-7. Epub 2016 Jan 26.

Gastrectomy plus chemotherapy versus chemotherapy alone for advanced gastric cancer with a single non-curable factor (REGATTA): a phase 3, randomised controlled trial

Kazumasa Fujitani [1], Han-Kwang Yang [2], Junki Mizusawa [3], Young-Woo Kim [4], Masanori Terashima [5], Sang-Uk Han [6], Yoshiaki Iwasaki [7], Woo Jin Hyung [8], Akinori Takagane [9], Do Joong Park [2], Takaki Yoshikawa [10], Seokyung Hahn [11], Kenichi Nakamura [3], Cho Hyun Park [12], Yukinori Kurokawa [13], Yung-Jue Bang [14], Byung Joo Park [11], Mitsuru Sasako [15], Toshimasa Tsujinaka [16]; REGATTA study investigators

Affiliations + expand

PMID: 26822397 DOI: 10.1016/S1470-2045(15)00553-7

- An international, cooperative, randomized, controlled trial (**REGATTA, JCOG0705/KGCA01**) failed to prove a survival benefit.

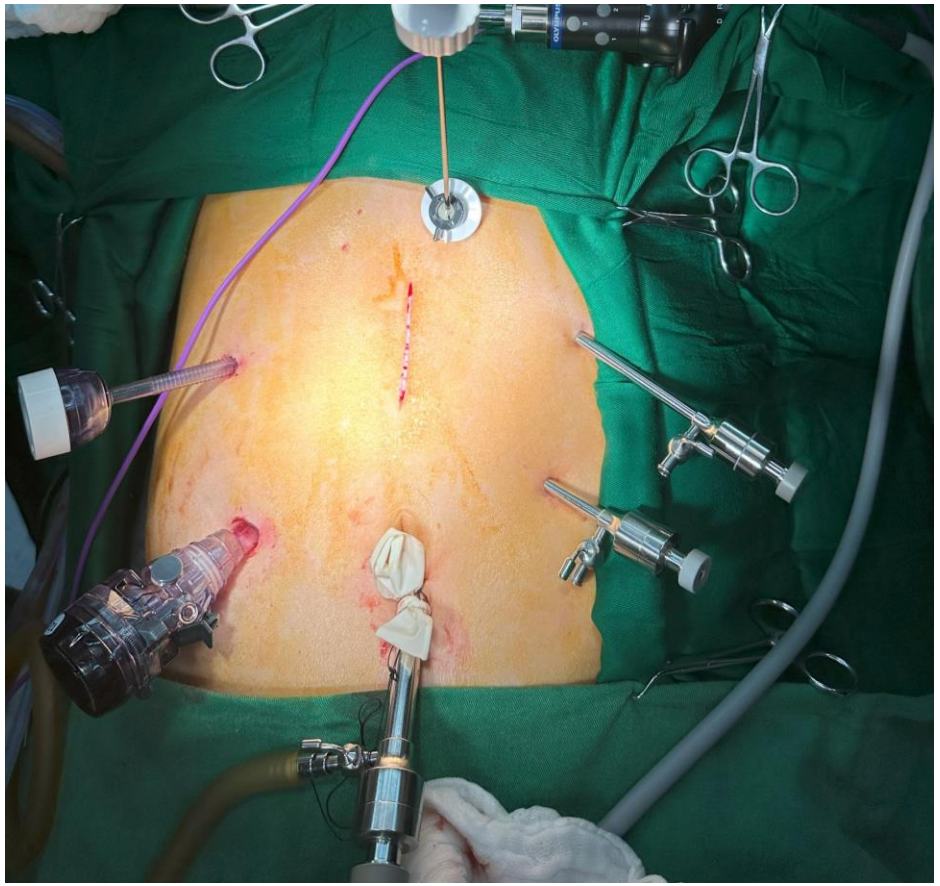
- Strongly advised not to perform this type of surgery.

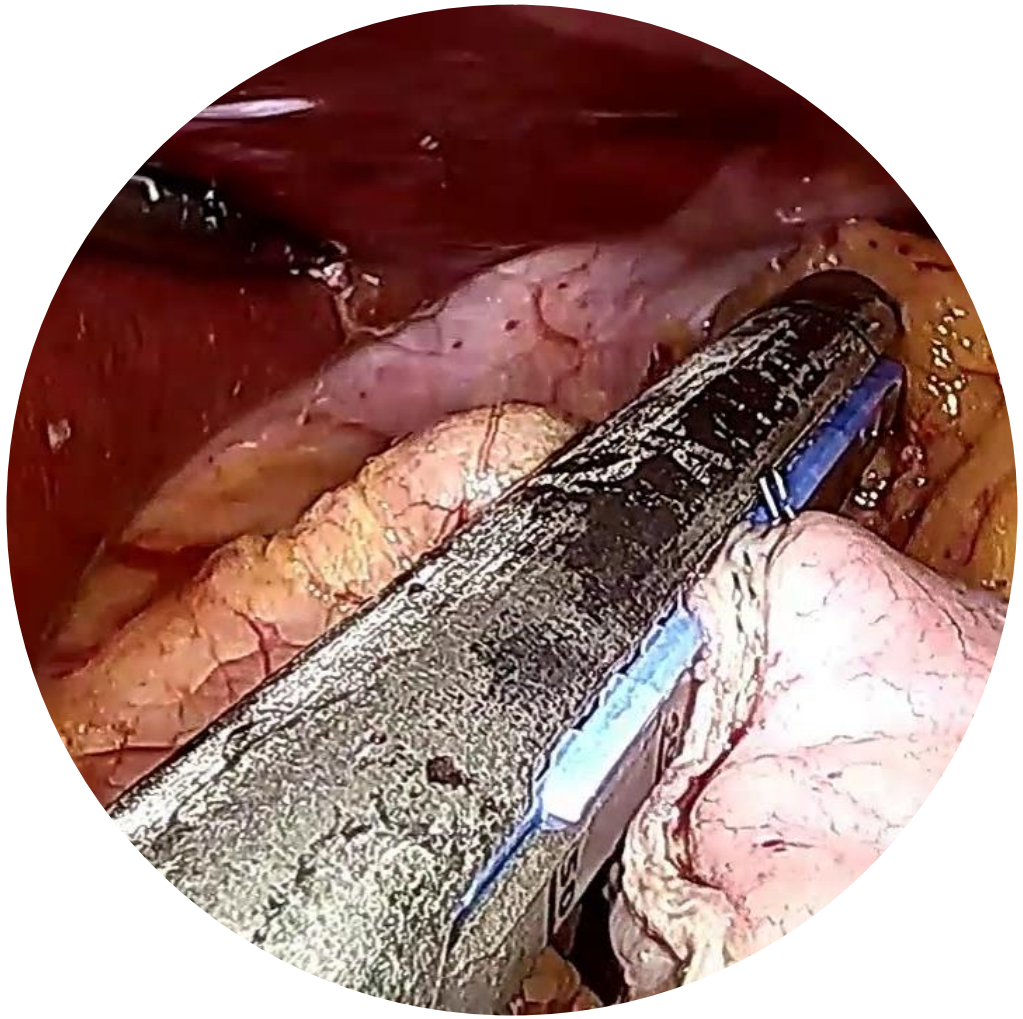
Conversion Surgery

- Surgical treatment with the goal of R0 resection in initially unresectable gastric cancer patients after response to chemotherapy.

Surgical Approaches

- Open Surgery
- Laparoscopic surgery
  - Totally laparoscopic (subtotal/total) gastrectomy
  - Laparoscopy assisted gastrectomy (distal/total)
  - Single port laparoscopic (distal/total) gastrectomy
  - Reduced port MIS
- Robotic surgery

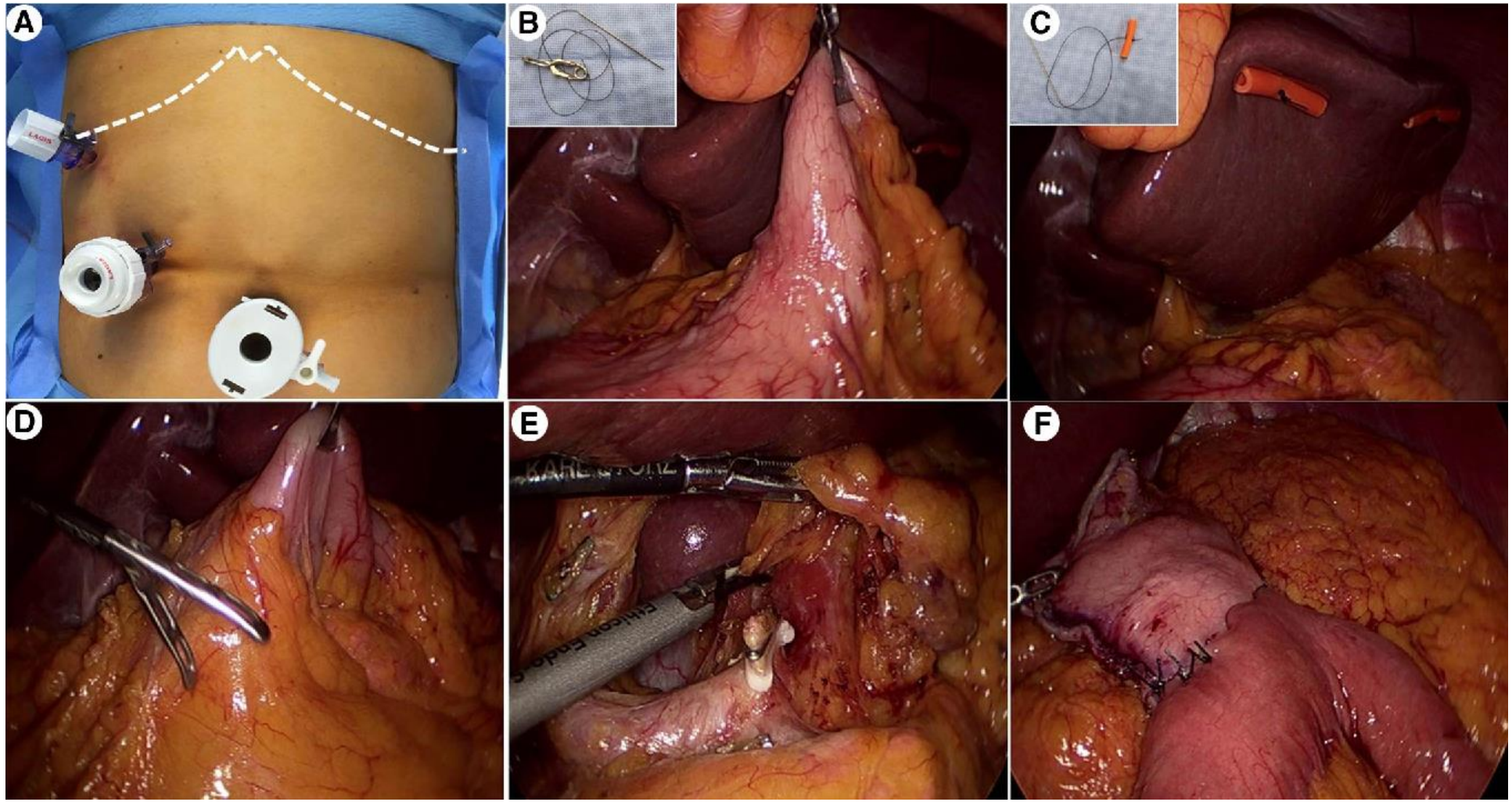




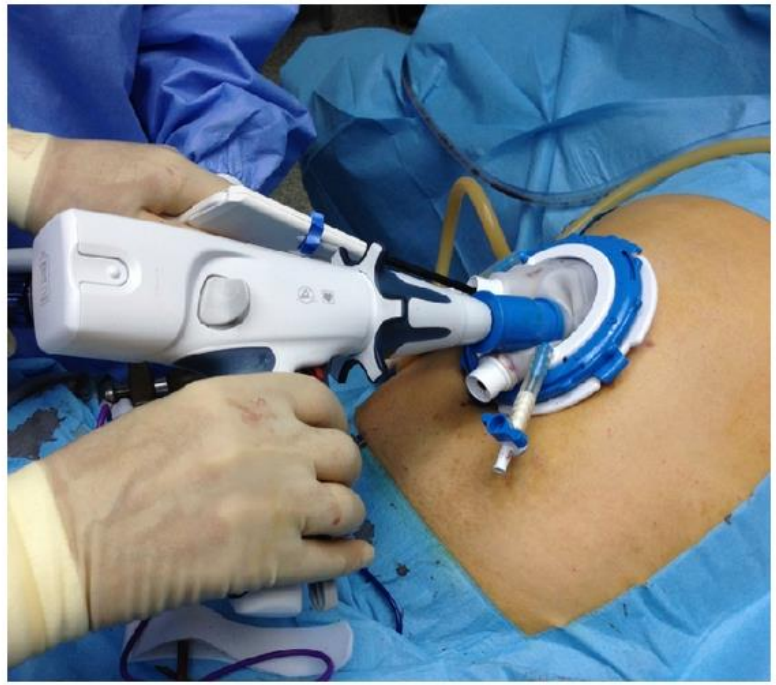
Laparoscopic gastrectomy

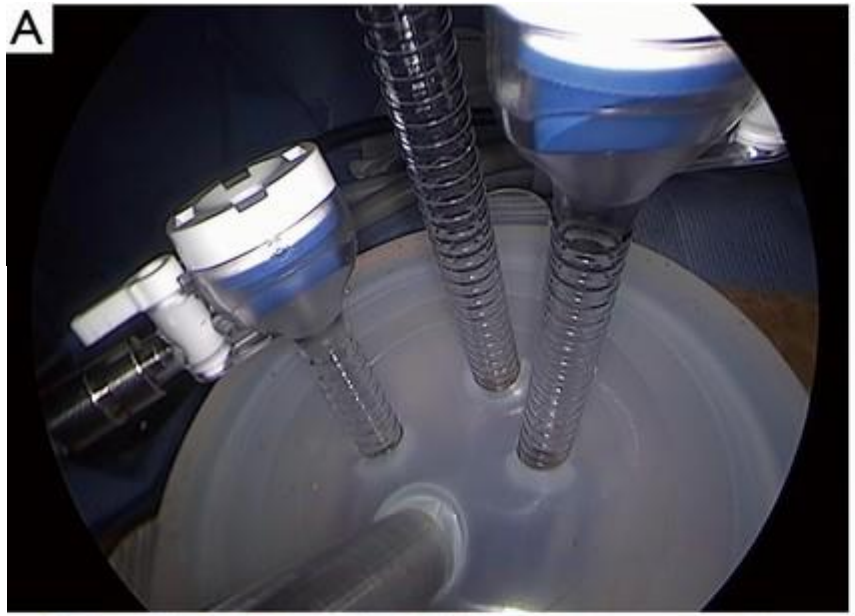
- Lap Distal Gastrectomy →
  - Strongly recommended for cStage I GC
- Lap total or proximal gastrectomy →
  - weakly recommended for cStage I GC
- For advanced cancer cStage II or more →
  - large-scale randomized clinical trials of lap distal gastrectomy confirmed safety and long-term survival

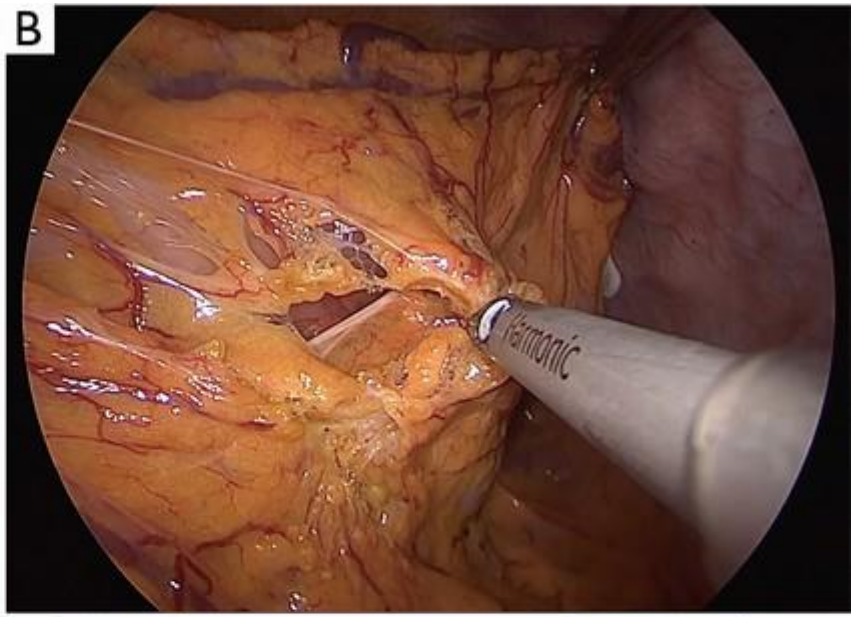
- Reduced port MIS

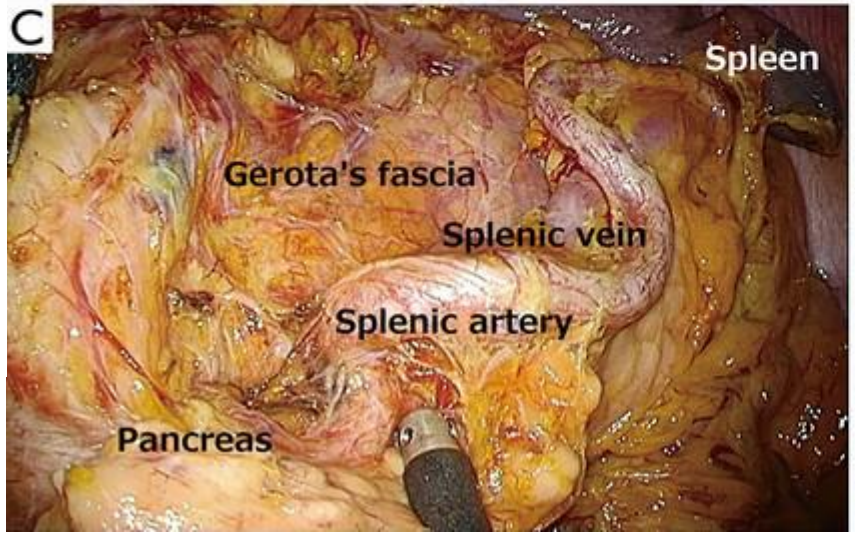


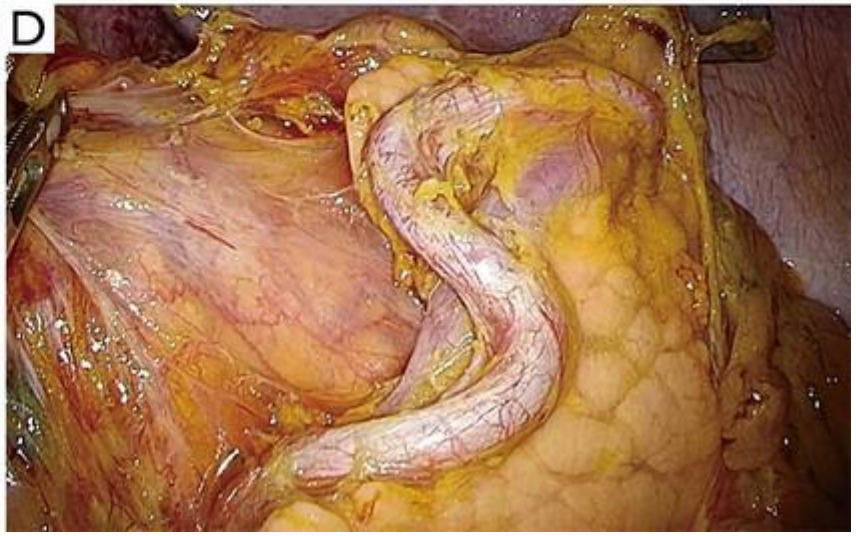
- Single port gastrectomy





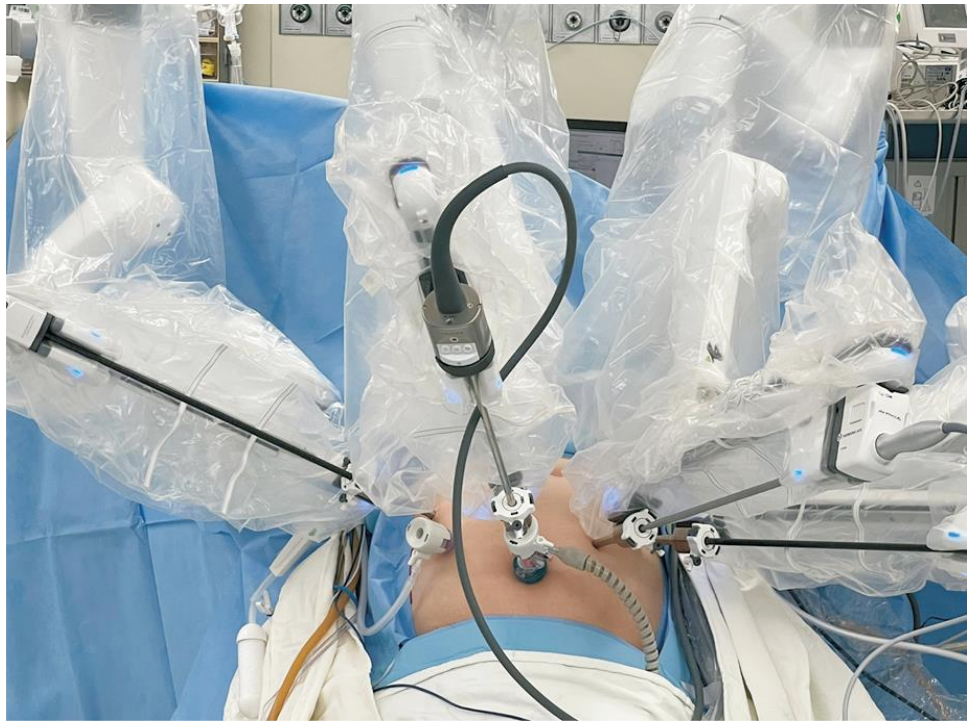






Robotic Gastrectomy

- RCTs showed non-inferiority of Robotic gastrectomy to laparoscopic.
- Less blood loss and improving lymphadenectomy
- Fewer complications
- Weakly recommended for cStage I GC



Enhance recovery after gastrectomy

- **ERAS Society recommendations**
  - Preoperative nutrition
  - Access : laparoscopic access fewer complications, faster recovery
  - Nasogastric tube : should not be used routinely
  - Peri anastomosis drains : avoid the use of abdominal drains
  - Early postoperative diet and artificial nutrition : start feeding on POD1 and increase intake according to tolerance

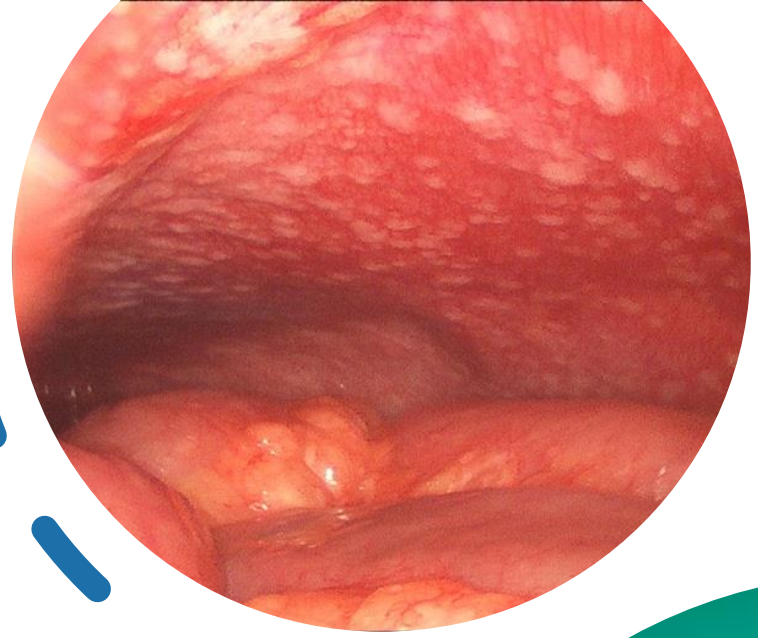
Desiderio J, Trastulli S, D'Andrea V, Parisi A. Enhanced recovery after surgery for gastric cancer (ERAS-GC): optimizing patient outcome. Transl Gastroenterol Hepatol 2020;5:11.

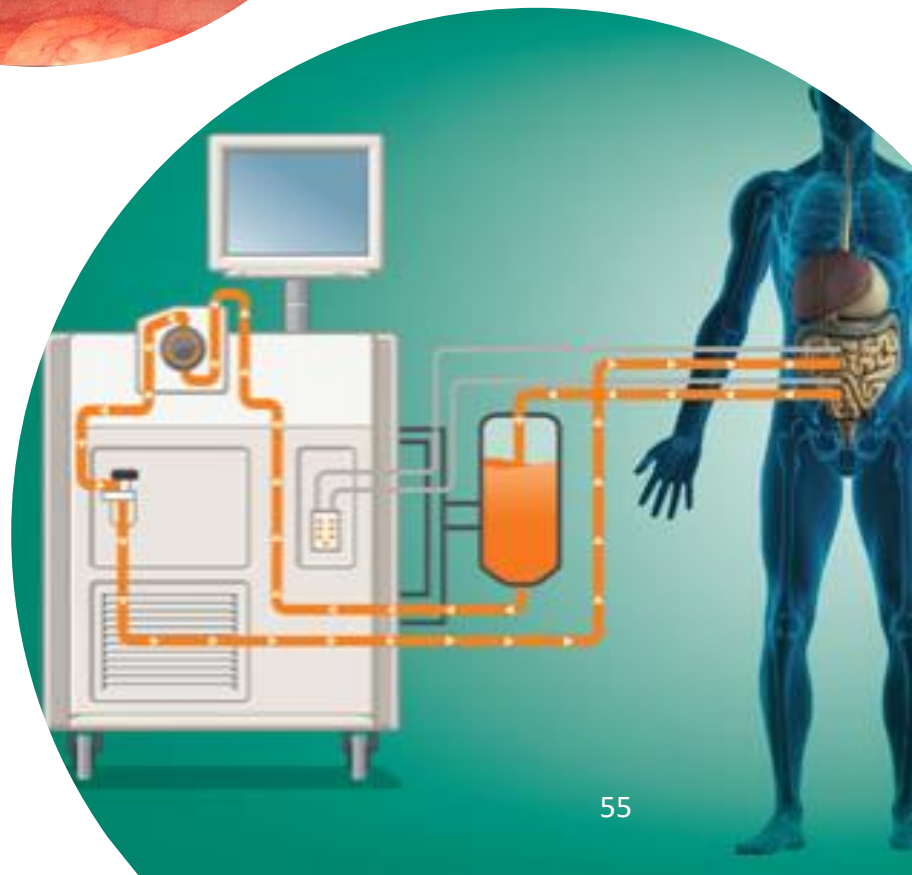
Treatment of Metastatic Gastric Cancer

CRS and HIPEC

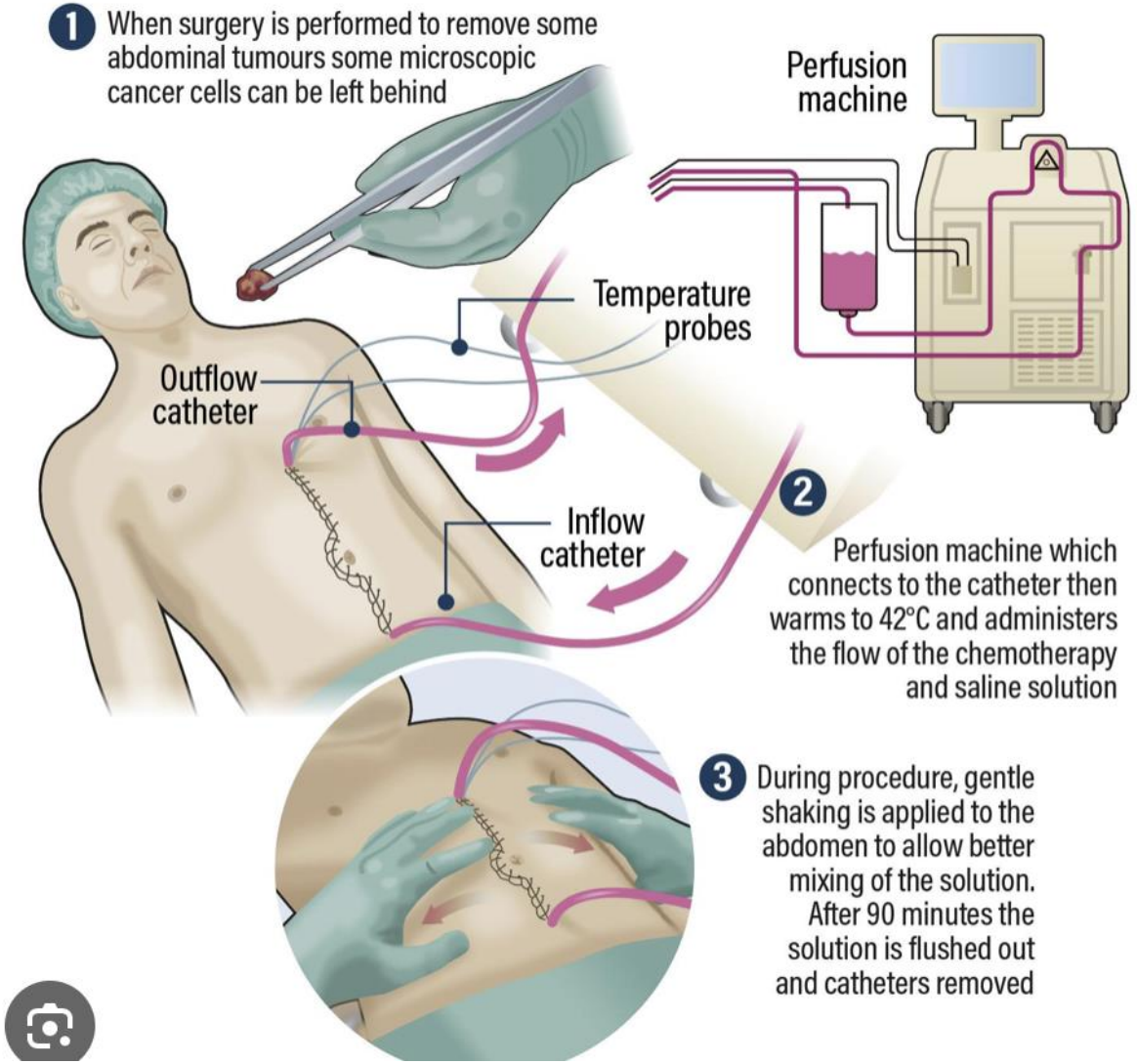
- **Cytoreductive Surgery** followed by **Hyperthermic Intraperitoneal chemotherapy**

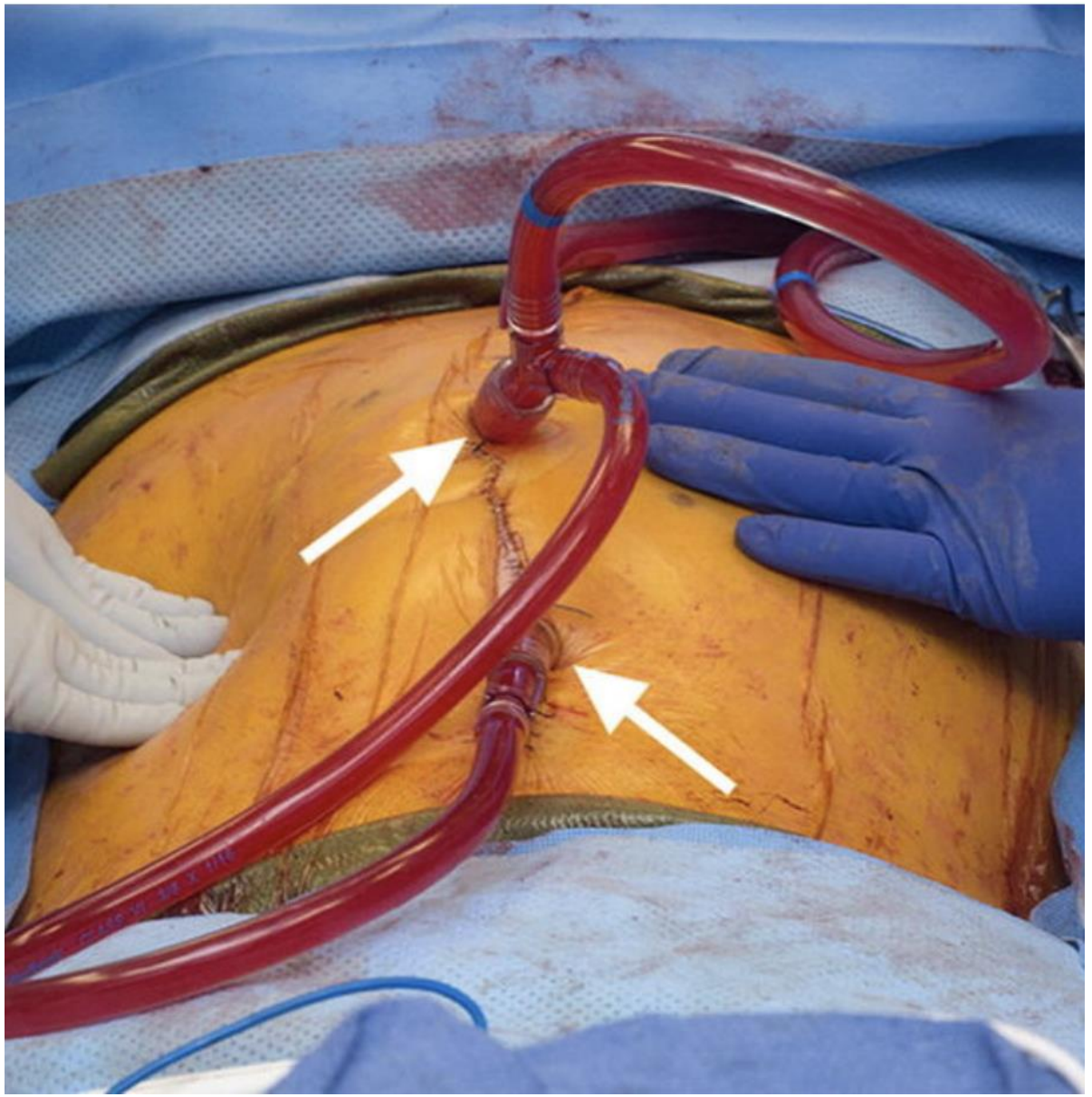
- The Goal of CRS is to remove all visible peritoneal lesions so that HIPEC is used only for free-floating cancer cells and micro- metastases on the peritoneum





HIPEC HEATED CHEMOTHERAPY TREATMENT





CRS & HIPEC – Effect on survival

- Patients with limited disease and complete cytoreduction (CC-0) had an improved survival of 15 months, with 61% —1 year and 23%—5-year survival rates.
- The CYTO-CHIP study compared GC patients with PC and revealed higher 1-year (67.9% vs. 48.5%), 3-year (27.1% vs. 13.1%), and 5-year (20.2% vs. 7.4%) survival with CRS + HIPEC compared to CRS alone

Surgery for metastasis

Surgical resection after neoadjuvant chemotherapy is weakly recommended for a small number of paraaortic lymph node metastases confined to No.16a2/b1.

Surgical resection is weakly recommended for solitary liver metastasis without other incurable factors (strength of evidence C)

Our current status

Resection ✓

New approaches

Laparoscopic Gastrectomy ✓

Radicality – R0 ✓

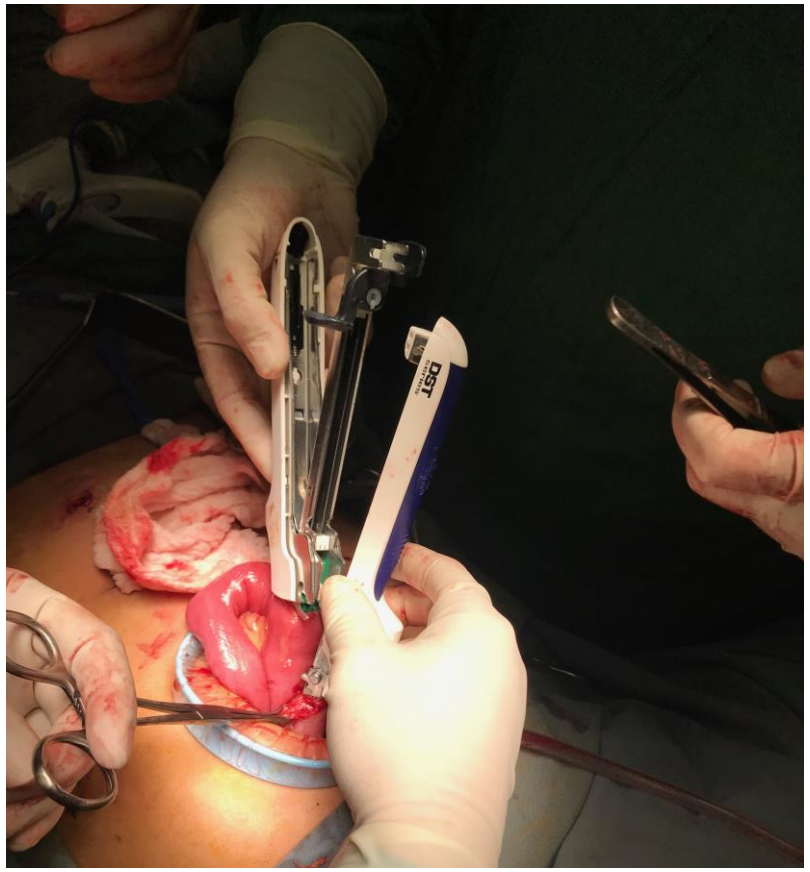
LN dissection – D2 ✓

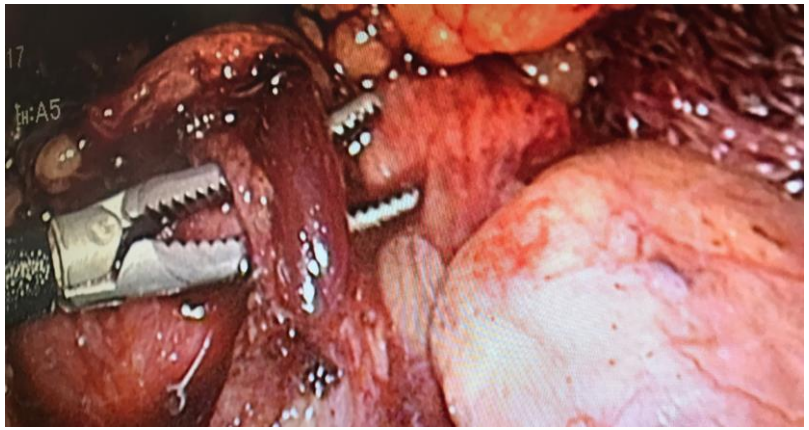
Enhanced Recovery ERAS ?

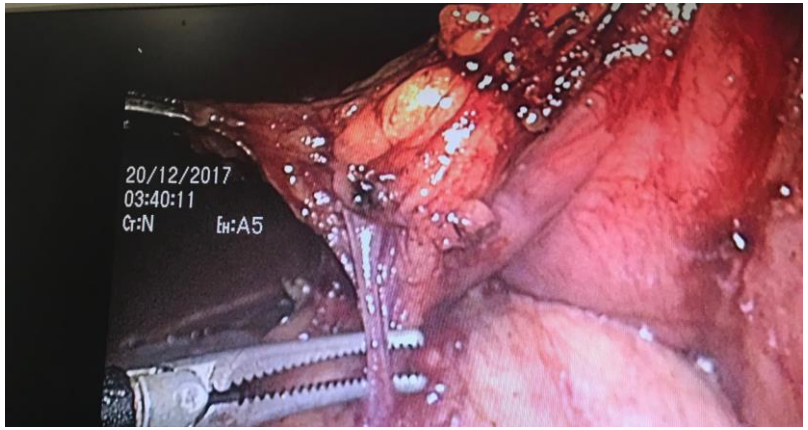
Reconstruction - Handsewn staplers ✓ ✓

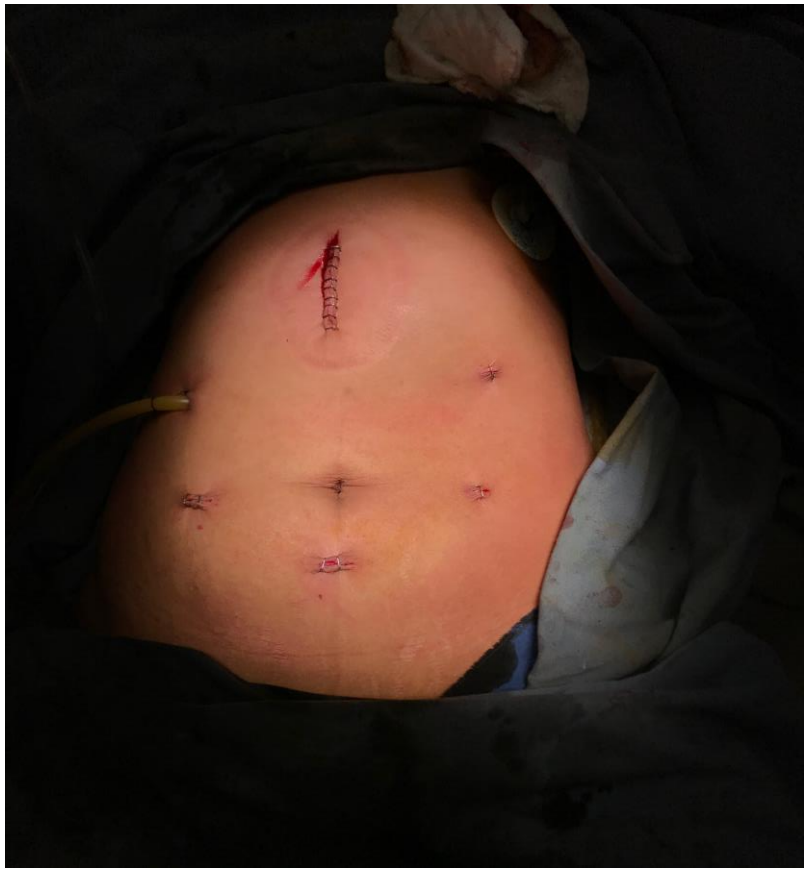
Procedures we are doing

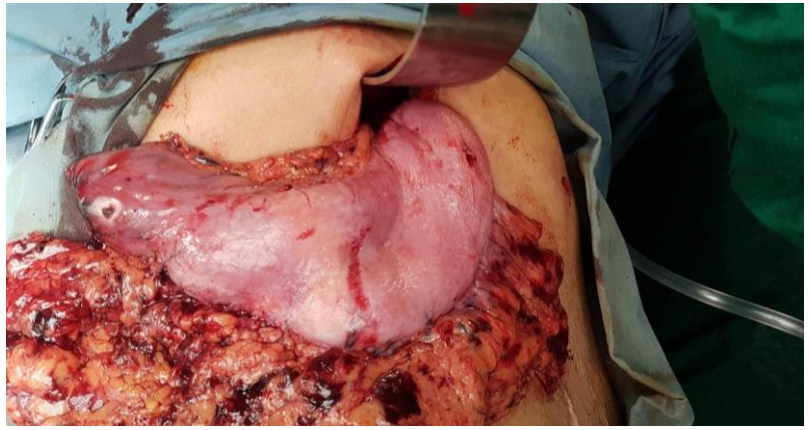
- Radical subtotal distal gastrectomy (Distal gastrectomy + D2 LN dissection)
- Total gastrectomy (TG + OJ + D2 LN dissection)
- Laparoscopic Assisted Distal Gastrectomy (LADG)
- LATG
- Proximal gastrectomy
- Palliative procedures
- Staging laparoscopy











Our current status

Take home message

- Gastric cancer is no more a grief disease if detected early and with proper management.
- Curative surgery is the only hope for long term survival.
- Modern surgery is very promising.
- We are striving to provide the standard surgical treatment to all our GC patients.


THANK YOU!

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HAVE A NICE DAY