

Gastric Carcinoma – Experiences with Comparison of D2 And mD2 Lymphonodectomy

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1. Summary

Stomach cancer, also called gastric cancer, begins when cells in the stomach start to grow out of control. A tumor can be cancerous or benign. A cancerous tumor is malignant, meaning it can grow and spread to other parts of the body. A benign tumor means the tumor can grow but will not spread. Cancer can begin in any part of the stomach. It can also spread to nearby lymph nodes and other parts of the body, such as the liver, bones, lungs, and the ovaries. Most stomach cancers are a type called adenocarcinoma. Adenocarcinoma is a broad term describing any cancer that begins in the glands or glandular tissue that lines some organs, including the stomach. Other types of cancerous tumors that form in the stomach include lymphoma, gastric sarcoma and neuroendocrine tumors, but these are rare (1). Special kind of gastric carcinoma from gynecological aspect is Krukenberg tumors are ovarian metastases from non-gynecological, mainly gastrointestinal cancers, such as gastric and colorectal cancers. These tumors are bilateral at approximately 80% of cases affecting women, especially young women with significant morbidity and symptomatology. Previous retrospective studies suggested that Krukenberg tumors were associated with poor prognosis compared to metastatic disease at other sites arising from the same primary. Also the independent nosologic stage is early gastric cancer (EGC) is a well-defined gastric malignancy that is limited to the mucosa or submucosa, irrespective of lymph node metastasis. At an early stage, gastric cancer often does not cause symptoms until it becomes advanced, and it is a heterogeneous disease and usually encountered in its late stages.

2. Introduction

As the fourth leading cause of cancer-related death and the fifth most commonly diagnosed cancer in the world, stomach cancer accounted for 1.1 million new cases (representing 5.6% of all cancer cases) and 7.6 hundred thousand new deaths (representing 7.7% of all cancer cases) worldwide in 2020 (2). In total, ~1.1 million new cases and 770,000 deaths of gastric cancer were estimated in 2020. Incidence rates were on average 2-fold higher in males than females (15.8 and 7.0 per 100,000, respectively) with variation across countries. Highest incidence rates were observed in Eastern Asia for both males and females (32.5 and 13.2, respectively); males residing in Japan (48.1), Mongolia (47.2) and Korea (39.7) had the highest rates in the world. Incidence was lowest in Africa with incidence rates < 5 per 100,000. Highest mortality rates were observed in Eastern Asia for both males (21.1) and females (8.8). A lower share of deaths was observed in very high HDI countries compared to medium and low HDI countries. The annual burden of gastric cancer is predicted to increase to ~1.8 million new cases and ~1.3 million deaths by 2040 (3). The 5-year relative survival rate for stomach cancer is 36%. This means that, overall, people diagnosed with stomach cancer are 36% as likely as similar people who do not have stomach cancer to be alive 5 years after diagnosis. The 5-year relative survival rates for different stages of stomach cancer are:

- 75% for localized stomach cancer (cancer is in the stomach only)
- 35% for regional stomach cancer (cancer has spread beyond the stomach to nearby lymph nodes or organs)

•7% for metastatic stomach cancer (cancer has spread beyond the stomach to a distant part of the body) (4).

3. Classification of Gastric Carcinoma

3.1. 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
- T1a: tumor invades the lamina propria and or muscularis mucosae
- T1b: tumor invades submucosa
- T2: tumor invades muscularis propria
- T3: tumor penetrates the subserosal connective tissue without invasion of the visceral peritoneum or adjacent structures
- T4
- T4a: tumor invades the serosa (visceral peritoneum)
- T4b: tumor invades adjacent structures

3.2. Lymphatic Nodes

- Nx: regional lymph node (s) cannot be assessed
- N0: no regional nodal involvement
- N1: metastases in 1 to 2 regional lymph nodes
- N2: metastases in 3 to 6 regional lymph nodes
- N3
- N3a: metastases in 7 to 15 regional lymph nodes
- N3b: metastases in more than 15 regional lymph nodes

3.3. Metastasis

- M0: no distant metastases
- M1: distant metastases

4. Diagnostics of Gastric Carcinoma

4.1. Upper Endoscopy

Also called esophagogastroduodenoscopy or EGD is the test most often done diagnosis method. Unfortunately, some types of stomach cancers can be hard to see during an endoscopy. Endoscopy can also be used as part of a special imaging test known as endoscopic ultrasound. In some situations, endoscopy can be used to help remove very early-stage cancers. It can also be used to help prevent or relieve symptoms or other complications from stomach cancer, without the need for more extensive surgery.

4.2. Biopsy

During a biopsy small piece (samples) of the abnormal area are removed and sent to histological examination. In cases of scirrhous gastric carcinoma there are possible difficulties to get adequate histological tissue to confirm malignancy because mucosa could be not affected. In diffuse affection of gastric wall we have to think

about lymphoproliferative spread of disease (MALT). Biopsies may also be taken from areas of possible cancer spread, such as nearby lymph nodes or suspicious areas in other parts of the body.

4.3. Imaging Tests

Imaging tests use x-rays, magnetic fields, sound waves, or radioactive substances to create pictures of the inside of your body. Imaging tests may be done for a number of reasons, including:

To help find out if a suspicious area might be cancer

To learn how far cancer may have spread

To help determine if treatment has been effective

Upper gastrointestinal (GI) series

4.4. Computed Tomography (CT or CAT) Scan

CT uses x-rays to make detailed, cross-sectional images of the soft tissues in the body. CT scans can show the stomach fairly clearly and often can confirm the location of a cancer. CT scans can also show other parts of the body to which stomach cancer might have spread, such as the liver and nearby lymph nodes. CT scans can also be used to guide a biopsy needle into a suspected area of cancer spread.

4.5. Endoscopic Ultrasound

Endoscopic ultrasound (EUS) is often used to see how far a cancer might have spread into the wall of the stomach, or into nearby areas or nearby lymph nodes. EUS can also be used to help guide a needle into a suspicious area to get a biopsy sample (known as an EUS-guided needle biopsy). Fluorescence endoscopy is a promising method adding diagnostic value in the detection of neoplasia, adenomas, and assessment of tumor invasion within the gastrointestinal tract. More studies are needed to utilize the feasibility of fluorescence endoscopy compared with other endoscopic methods.

4.6. Positron Emission Tomography (PET) Scan

A PET scan can be useful to help determine the extent of the cancer in the body. The picture is not detailed like a CT or MRI scan, but a PET scan can look for possible areas of cancer spread in all areas of the body at once. There is need to performed angio-CT because in more cases there is either aberrant or abnormal topography of arteria hepatica sinistra from arteria gastrica sinistra. It is important for performing ligation of AGS in tripus Halleri to prevent left-side hepatic ischemia.

4.7. Magnetic Resonance Imaging (MRI)

Like a CT scan, an MRI can show detailed images of soft tissues in the body. But MRIs use radio waves and strong magnets instead of x-rays. This test is not used as often as CT scans to look for stomach cancer, but it may be helpful in certain situations, such as when looking for tumors in the liver.

4.8. Chest x-ray

This test can help show if the cancer has spread to the lungs. It might also be used to help determine if a person has any serious

lung or heart diseases, which might affect whether surgery would be a treatment option. A chest x-ray isn't needed if a CT scan of the chest has been done.

4.9. Laparoscopy

If stomach cancer has already been found, and imaging tests such as CT or PET scans have not shown it has spread to other parts of the body, doctors might do a laparoscopy before any other surgery. This can help confirm the cancer is still only in the stomach, which means surgery to remove it might still be an option (5).

5. Treatment of Gastric Carcinoma

5.1. Endoscopic Mucosal Resection

Endoscopic mucosal resection is a procedure that uses an endoscope to remove carcinoma in situ and early-stage cancer from the lining of the digestive tract.

5.2. Surgery

Chemotherapy may be given before surgery to shrink the tumor and reduce the amount of tissue that needs to be removed during surgery. Chemoradiation given before surgery, to shrink the tumor, is being studied. It is called neoadjuvant therapy. Treatment given after surgery, to lower the risk that the cancer will come back, is called adjuvant therapy. Patients may be given chemotherapy, radiation therapy, or both to kill any cancer cells that are left. Surgery is a common treatment for stomach cancer. The type of surgery depends on where the cancer is located.

5.3. Gastrectomy

Gastrectomy, the removal of part or all of the stomach, is the main surgery for stomach cancer:

- Subtotal gastrectomy is the removal of the part of the stomach that contains cancer, nearby lymph nodes, and parts of other tissues and organs near the tumor.
- Total gastrectomy is the removal of the entire stomach, nearby lymph nodes, and parts of the esophagus, small intestine, and other tissues near the tumor.

5.4. Problematics of Surgical Treatment according to Stage of Disease and Survival Rate

Currative resection in cases of early stages of disease together with lymphonodectomy D2/mD2, when preoperative staging is corresponds with postoperative stage. Potentially currative resection in cases underestimated preoperative staging and worse histopathological findings, with D2/mD2 lymph node dissection. Paliative resection is only necessary in cases when patient has dysphagia grade IV or in cases of bleeding that is not possible to be treated endoscopically. In this case the lymphonodectomy is not necessary because the range of disease is so wide that lymphonodectomy would not increase the survival rate (Figures 1-6).

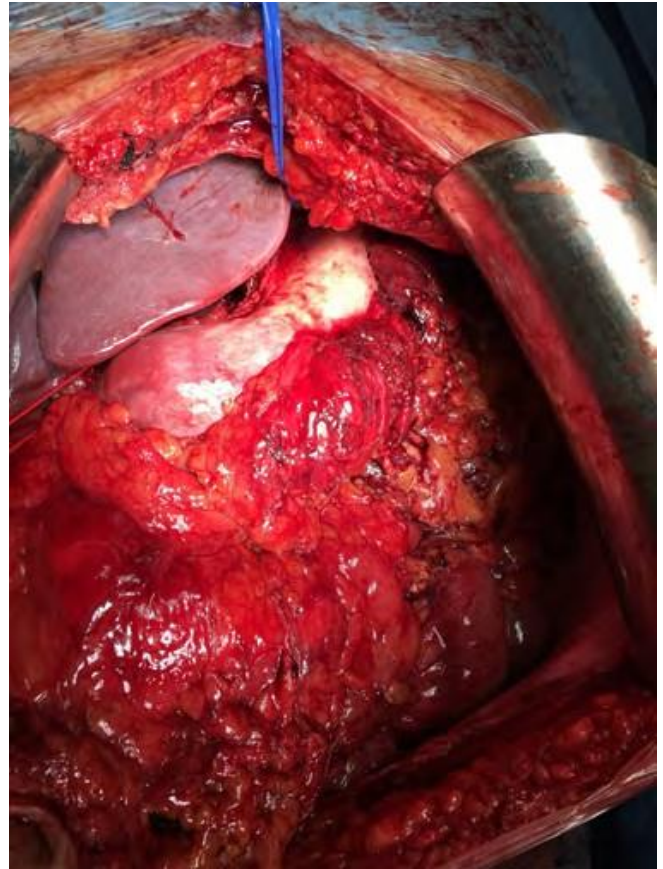
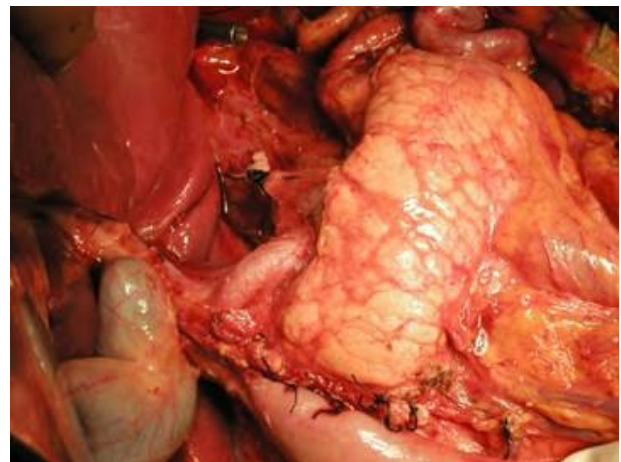


Figure 1: locally advanced gastric carcinoma





Figures 2 and 3: Total gastrectomy with mD2 dissection of lymph nodes



Figure 4: ligation of arteria gastrica sinistra in tripus Halleri



Figure 5: Total gastrectomy with D2 dissection of lymph nodes

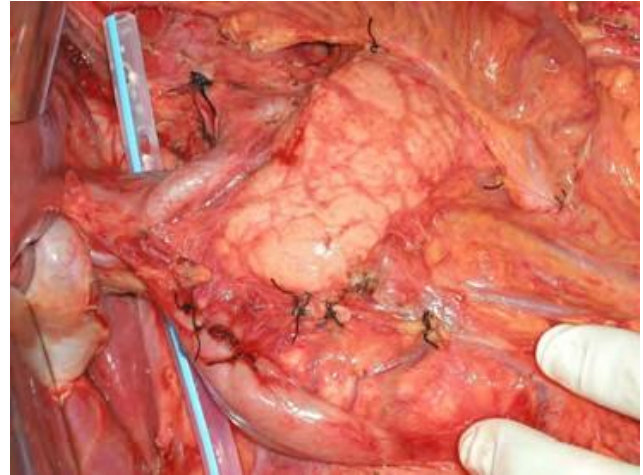


Figure 6: Total gastrectomy with reconstruction of Roux-en-Y – esophago-jejuno anastomosis and mD2 dissection and entero-entero sec. Braun

6. Other Possibilities of Treatment of Advanced Stages Paliative Treatment

6.1. Endoluminal Stent Placement

Endoluminal stent placement may be done when the tumor blocks the passage into or out of the stomach. In this procedure, the surgeon places a stent (a thin, expandable tube) from the esophagus to the stomach or from the stomach to the small intestine to allow the patient to eat normally.

6.2. Endoluminal Laser Therapy

Endoluminal laser therapy is a procedure in which an endoscope (a thin, lighted tube) with a laser attached is used as a knife to open a gastrointestinal blockage.

6.3. Gastrojejunostomy

Gastrojejunostomy is the removal of the part of the stomach with cancer that is blocking the opening into the small intestine. Then the surgeon connects the stomach to the jejunum (a part of the small intestine) to allow food and medicine to pass from the stomach into the small intestine (4).

6.4. Problematics of Range of Lymphonodectomy and its' Effect on Survival Rate

Long-term comparison in results of survival rate between Japan and Europe and USA and the dispute over effect of radical lymphonodectomy still stays in place. One of arguments why Japan is so significantly better in results of survival rate (57%) comparing to Europe/USA (17%) is the high prevalence of early gastric carcinoma in Japan. Japanese standard lymphonodectomy is in range of D2, in Europe/USA is D1 lymphonodectomy as a standard. According to these facts the Europe started to emphasize the D2 lymphonodectomy. Lymph node metastasis depend on depth of invasion of primary tumor

-musoca - 5%

-submusoca - 20%

- musc.propria - 40%
- subserosa - 70%
- serosa - 90%

Therefore in stages T2 and T3, when the probability of lymph node affected is up to 40% , is the range of dissection less than D2 principally not acceptable (6). Advanced surgical technique can perform modified D2 (mD2) resection, where the difference from standard D2 dissection is overall removal of lymph nodes alongside of splenic vasa and spleen hilus without splenectomy. Effect of radical lymph node dissection on 5-year survival rate is obvious in all stages of the disease (7).

6.5. Complications of Gastrectomy

- Postoperative bleeding
- Anastomosis leak
- Bile reflux
- Dumping syndrome - when food travels to the small intestine before it's been broken down enough. This can cause symptoms such as nausea, bloating, pain and diarrhea.
- Malnutrition
- Internal hernia

7. Discussion

In 80 patients in pTN stages T2N0M0 to T3N2M0 was performed in 76 cases gastrectomy with mD2 dissection of lymph nodes, in 4 cases gastrectomy with D2 dissection. There wasn't any increase of mortality or morbidity in comparison of the type of dissection. Practical experiences with mD2 dissection require patience and preciseness of the surgeon, and in 4 cases D2 dissection with splenectomy there was massive lymphadenopathy in hilus of the spleen. After splenectomy there is need for vaccination in following 3 months with pneumococci, Haemophyllus influenzae B and meningococci. We can recommend mD2 dissection as safe method in surgical treatment of gastric carcinoma.

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