Correspondence

The General Rules for the Gastric Cancer Study in Surgery

Japanese Research Society for Gastric Cancer

1. Number of the out-patients with gastric cancer.

1a. Total number of out-patients with gastric cancer in the entire hospital or institute (In the university hospitals, all out-patients from the departments not only of surgery but also of internal medicine, radiology, etc. are included).

1b. Total number of out-patients with gastric cancer in the surgical department. Care must be taken not to count the same patient twice who is under treatment in other departments. In such an occasion, the patient should be counted as surgical.

2. Total number of patients with gastric cancer admitted to the surgical department

3. Total number of operations for gastric cancer.

3a. All types of primary operations for gastric cancer. Reoperations are not counted.

3b. Those who had previous laparotomy for gastric cancer are regarded as non-primary cases and are excluded from this statistics. They are recorded separately.

Note:

Those who had previous gastric surgery for non-cancerous lesions are not restricted by rule 3b. For instance, those who had gastric resections for ulcer should develop cancer in the gastric remnant, they are counted as 3a. only if the benignity of the first lesions had been confirmed histologically. Time interval between the operations must be over 5 years.

4. Number of operation.

Operations for gastric cancer are classified into following 4 types. Numbers and percentages of each type of operations should also be recorded.

4a. Gastric resection including total gastrectomy . . . . . refer to 17a. and b.

4b. Gastric anastomosis (not only gastrointestinal anastomosis but also esophagojejunostomy and esophagogastrostomy without gastrectomy are included).

4c. Exploratory laparotomy (with or without chemotherapy and/or radiotherapy).

4d. Others (gastrostomy, jejunostomy etc.)

If the patient undergoes more than two types of operations, the type of major operation should be recorded. If an operation is carried out for other than the cancerous lesion per se, such as chordotomy, the procedure is not included.

5. Location of gastric cancer and its primary site (Fig. 1 and 2).

5a. The greater and lesser curvatures of the stomach are divided into 3 equal parts and the stomach is divided into 3 portions by drawing lines between corresponding points. They are termed upper (C), middle (M), and lower portions (A) (Fig. 1).

When the infiltration of gastric cancer is limited to any of the 3 portions of the

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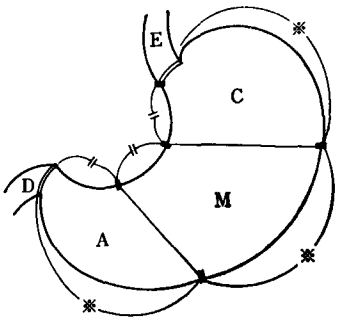

Fig. 1.

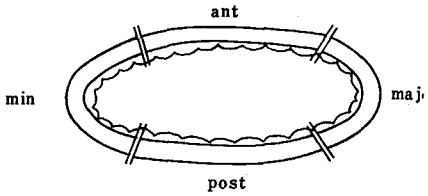

Fig. 2.

stomach, the location is expressed as C, M, or A. If the lesion extends across these lines, the discription of the portion mainly involved comes first and the portion less invaded comes next such as MC. If the cancer of upper portion extends into the esophagus(E), or if the cancer of lower portion extends into the duodenum(D), the location of involvement is expressed as CE or AD respectively. If the cance rinvolves all three portions, the portion of grater involvement is written before others less affected: for instance, AMC, MCA, MAC and CMA.

5b. The stomach is further divided into the lesser curvature (Min), greater curvature (Maj), anterior wall (Ant), posterior wall (Post) and circumferential area (Circ). The above mentioned portions are shown in Fig. 2 on a cross section of the stomach, where the circumference of the stomach is divided into 4 equal parts.

5c. If the primary site of cancer is presumable, the representing sign of the portion is underlined, such as, MCA, Min Post.

6. Macroscopic classification of the degree of serosal invasion.

S_0: No invasion of cancer to the serosa.

S_1: Invasion of cancer to the serosa is suspected.

S_2: Definite invasion of cancer to the serosa.

S_3: Infiltration of cancer to other organ(s).

Note:

1) When the extent of infiltration is slight at the greater and lesser omentum adjacent to the stomach or the mesocolon, it is grouped into S_2 rather than S_3.

2) The infiltration to the sourrounding peritoneum from the metastatic lymph node is judged according to the above rule. However, when the degree of infiltration from metastatic lymph nodes is greater than that from the primary site, the degree of S should be based on the infiltration from the former.

7. Macroscopic classification of the extent of disseminating metastasis to the peritoneum.

P_0: No disseminating metastases to any serosal surfaces except gastric serosa, i.e. greater and lesser omentum, mesenterium, visceral peritoneum, parietal peritoneum and retroperitoneum.

P_1: Disseminating metastasis to adjacent peritoneum (above the transverse colon with the greater omentum included) without distant peritoneal metastasis.

Note:

Distant peritoneum means the peritoneum below the transverse colon and the abdominal surface of the diaphragm.

P_2: Few metastases to the distant peritoneum

Note:
If only ovarian metastasis is found, it is grouped into P_2.

P_3: Numerous metastasis to the distant peritoneum.

8. Macroscopic classification of the degree of liver metastasis.

H_0: No liver metastasis is found.

H_1: Metastasis limited to one of the liver lobes.

Note:
In case of right lobe metastasis, it is written H_1 (dex), and left lobe metastasis H_1 (sin).

H_2: Few scattered metastases to both lobes.

H_3: Numerous scattered metastases to both lobes.

9. Classification of the degree of lymph nodes metastasis.

9a. Classification based on macroscopic findings.

The definition of regional lymph nodes of the stomach is shown in Table 1. Lymph nodes of Group 1, 2 and 3 in Table 1 are referred to as N_1, N_2 and N_3 respectively. Distant lymph nodes located further than group 3 are referred to as N_4.

N (−): No lymph node metastasis is suspected.
$N_1(+)$: Metastasis to lymph nodes of group 1.
$N_1(-)$: No metastasis to lymph nodes of group 1.
$N_2(+)$: Metastasis to lymph nodes of group 2.
$N_2(-)$: No metastasis to lymph nodes of group 2.
$N_3(+)$: Metastasis to lymph nodes of group 3.
$N_3(-)$: No metastasis to lymph nodes of group 3.
$N_4(+)$: Metastasis to lymph nodes located further than group 3.
$N_4(-)$: No metastasis to lymph nodes located further than group 3.

To simplify the notes, underline can be used, for instance, $\underline{N_2(+)}$ means $N_1(+)N_2(+)$ or $N_{1,2}(+)$.

9b. Classification based on histologic findings.

Results obtained from the histologic examination of the lymph nodes removed at the time of operation are expressed as n_0, n_1, n_2, n_3 and n_4 as those in 9a.

Note:
The method of histological examination of metastatic lymph node must be clearly recorded by one of the followings:

1) Serial sections of the removed lymph node are made.
2) If the metastasis in the removed lymph node is not recognized in the specimen prepared of a central section including the hilus as shown in Fig. 3a, two more specimens are prepared in sections which are cut parallel to the first section as Fig. 3b.
3) A lymph node slice is prepared of the central region section as shown in Fig. 3 a.
4) For each lymph node group, take one or several sections from the most suspected lymph node. These are prepared according to one of the above mentioned methods 1), 2) or 3).
In this instance, the examination of the lymph node which is most distant from the affected area is preferable.

Table 1. Grouping and name of lymph nodes used in surgical dissection.

Site of TUMOR	*α*) In case of AMC, MAC, MCA and CMA	*β*) In case of A, AM	*γ*) In case of MA, M, MC	*δ*) In case of C, CM
group 1	(1) Right cardiac lymph node (2) Left cardiac lymph node (3) lymph node along lesser curvature (4) Lymph node along greater curvature (5) Suprapyloric lymph node (6) Infrapyloric lymph node	(3) Lymph node along lesser curvature (4) Lymph node along greater curvature (5) Suprapyloric lymph node (6) Infrapyloric lymph node	(3) Lymph node along lesser curvature (4) Lymph node along greater curvature (5) Suprapyloric lymph node (6) Infrapyloric lymph node (1) Right cardiac lymph node	(1) Right cardiac lymph node (2) Left cardiac lymph node (3) Lymph node along lesser curvature (4) Lymph node along greater curvature
group 2	(7) Lymph node along left gastric artery (8) Lymph node along common hepatic artery (9) Lymph node around celiac artery (10) Lymph node splenic hilus (11) Lymph node along splenic artery	(7) Lymph node along left gastric artery (8) Lymph node along common hepatic artery (9) Lymph node around celiac artery (1) Right cardiac lymph node	(2) Left cardiac lymph node** (7) Lymph node along left gastric artery (8) Lymph node along common hepatic artery (9) Lymph node around celiac artery (10) Lymph node at splenic hilus** (11) Lymph node along splenic artery	(7) Lymph node along left gastric artery (8) lymph node along common hepatic artery (9) Lymph node around celiac artery (10) Lymph node at splenic hilus (11) Lymph node along splenic artery (5) Suprapyloric lymph node* (6) Infrapyloric lymph node*
group 3	(12) Lymph node in hepatoduodenal ligament (13) Lymph node at posterior aspect of pancreas (14) Lymph node at the root of mesenterium	(2) Left cardiac lymph node (10) Lymph node at splenic hilus (11) Lymph node along splenic artery (12) Lymph node in hepatoduodenal ligment	(12) Lymph node in hepatoduodenal ligament (13) Lymph node at posterior aspect of pancreas (14) Lymph node at the root of mesenterium	(12) Lymph node in hepatoduodenal ligament (13) Lymph node at posterior aspect of pancreas (14) Lymph node at the root of mesenterium (110) Paraesophageal lymph node at lower part of thorax

(13) Lymph node at posterior aspect of pancreas	(111) Lymph node at diaphragm*
(14) Lymph node at the root of mesenterium	

Note:

1) Group 1, 2 and 3 indicate the grouping of lymphnodes according to their anatomical positions and do not imply that the lymph nodes belong to primary, secondary or tertiary regional lymph nodes.
For instance, (8) lymph node along the common hepatic artery, (10) lymph node at the splenic hilus and (11) lymph node along splenic artery in group 2 and 3 in Table 1 actually would belong to the primary regional lymph nodes.
2) Lymph nodes marked with* do not necessarily change the R-number, regardless of whether they are or are not removed. It depends on the position and extent of the lesion. In such an occasion, it should be noted as such and the number of cases should be recorded for statistical purposes.
3) In group 2 of column γ, removal of the lymph nodes marked with** is not necessary in cases of MA and M but is necessary in cases of MC. Statistical handling of these cases is in accordance with the above mentioned rule.
4) Lymph nodes of (110) and (111) in column δ are dealt with according to the rule of esophageal cancer.

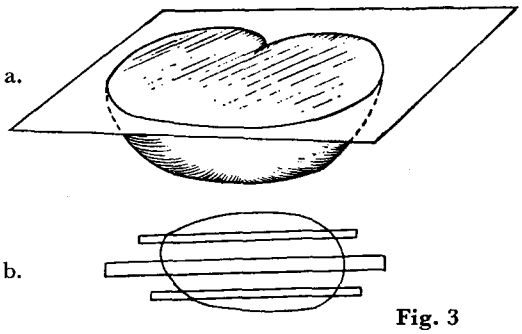

Fig. 3

10. Classification of gastric resections based on the extent of lymph node removal.

The following four types are differentiated.

R_0: Gastric resection with incomplete removal of lymph nodes of group 1 or with the removal of the tumor only.

R_1: Gastric resection with the removal of group 1 lymph nodes only.

R_2: Gastric resection with the removal of group 1 and 2 lymph nodes.

R_3: Regardless of the extent of gastric resection, removal of the lymph nodes including group 1, 2 and 3 is called extended radical resection.

The grading of the extent of the operation mentioned above depends on the extent of lymph node removal. If the lymph node removal is not complete, the type of operation is degraded except in cases of Rule 9, Note 2) and 3). The complete removal of the greater and lesser omentum is a rule except in the case of R_0. If the cancer invades the posterior serosa of the stomach, removal of anterior capsule of the pancreas is advised except in the case of R_0.

11. Macroscopic clasification of gastric cancer

11a. They are classified into the following 6 types as judged by inspection of the mucosal surface of the fresh specimen.

type 0: corresponds to the superficial cancer of 11b.

type 1: type 2: type 3: type 4: correspond to those of Borrmann's classification.

type 5 (unclassified): does not belong to any of those mentioned above.

Note:

Since the Borrmann's classification is for advanced gastric cancer, the classification of superficial cancer whose invasion is limited to the mucosa and the submucosa is not included. Therefore, it is classifiedas type 0 and is subdivided into three types (Fig. 4) according to the rules of the macroscopical classification of early gastric cancer set by the Japanese Association of Gastroenterological Endoscopy(Refer to the back of the title page of each number of the Journal, "Stomach and Intestine". Igaku Shoin, Tokyo, both in Japanese and English).

I. Protruded type

II. Superficial type

IIa. Elevated type

IIb. Flat type

IIc. Depressed type

III. Excavated type

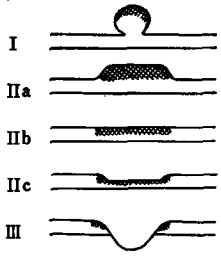

Fig. 4

11b. After fixation, the cut surfaces of the specimen are examined closely and classified into 4 types.

Superficial cancer: Intramucosal cancer, polypoid cancer or ulcerative cancer in the early stage without infiltration into proper muscle layer.

Localized type

Intermediate type

Infiltrating type

12. Cancer infiltration at the edge of the resected stomach.

12a. Macroscopic Examination of the fresh specimen.

OW
- +.....Cancer infiltration exists within 10 mm from the cut edge on the cardiac side. This includes the portion crushed by the Petz's clamp. (palpation may be employed)
- —.....None of the evidence mentioned above.

AW
- +.....Cancer infiltration exists within 10 mm from the cut edge on the pyloric side. This includes the portion crushed by the Petz's clamp (Palpation may be empolyed)
- —.....None of the evidence mentioned above.

12b. Histological examination of specimen

ow +.....Cancer cells is within 5 mm of the cut edge on the cardiac side.

—.....None of the evidence mentioned above.

aw +.....Cancer cells is within 5 mm of the cut edge on the pyloric side.

—.....None of the evidence mentioned above.

Note:

1) The distance between the nearest margin of the main tumor and the line of resection should

be measured macroscopically and recorded.

If the cancer infiltration exceeds the pyloric ring, the distance from the pyloric ring, or if the cancer exceeds the cardia of the stomach, the distance from the esophagogastric junction must be recorded respectively. A record of the type of infiltrating cancer, such as on mucosal side (m), and/or on serosal side (s) should also be kept. Pyloric ring indicaties the tip of the pyloric sphincter on the mucosal surface shown in Fig. 5.

2) The cardia of the stomach means the area covered with the cardiac glands. It is difficult to decide this macroscopically, however, and it is almost impossible to do so if this area is replaced by cancer tissue. Therefore, the cardia, here, is defined as an area of the stomach about 20 mm from the esophagogastric junction.

13. Histological Classification.

Refer to the draft presented by the pathdogical committee on histological calssification of gastric cancer of the General Rule (Part 2).

14. Classification of the extent of the gastric resection.

14a. Total resection

14b. Partial resection-1

Resection of the pyloric side of the stomach

Subtotal resection.....Resection of 4/5 or more

Regular resection..... Resection of less than 4/5

14c. Partial resection-2

Resection of the cardiac side of the stomach

Subtotal resection..... Resection of 4/5 or more

Regular resection..... Resection of less than 4/5

14d. If the combined resection is done with any of the following organs such as the spleen, liver, pancreas, transverse colon, gallbladder, adrenal galnd or kidney, it is added to the above-mentioned, a, b and c, respectively. But as to the pancreas, only in case in which the pancreas is resected partially is it then included in combined resection.

15. The type of reconstructive procedure (omitted).

16. Curative resection and non-curative resection.

16a. Histological definition

Resection (including total resection) is classified into the following 4 types.

a)	Curative resection	A. Absolute curative resection
		B. Relative curative resection
b)	Non-curative resection	A. Relative non-curative resection
		B. Absolute non-curative resection

a)-A: No metastasis to the liver and peritoneum, no cancer infiltration to the cut edge of the stomach (Ho, Po ow(−), aw(−),). The degree of the serosal invasion being S_2 or less and the n(+)number smaller than the R number.

In case of S_3 for which a suitable combined resection is carried out, a)-A can be applied.

a)-B: Same as a)A except n(+)number is equal to the R-number.

The simple term "curative resection" means both a)-A and a)-B.

The case beyond the definition of the curative resection is called non-curative resection.

The case with possible complete removal of the cancer in non-curative resection is classified as b)-A relative non-curative resection. If the cancer cells clearly remains,

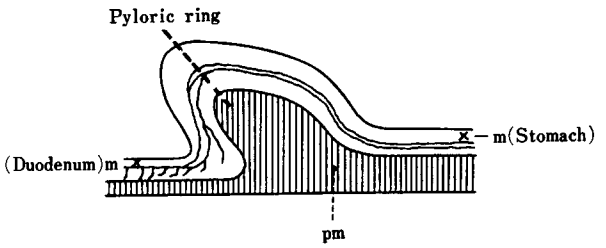

Fig. 5.

the case is classified as b)-B absolute non-curative resection.

16b. Macroscopic definition.

In relation to the above-mentioned conditions, when N instead of n, OW, AW instead of ow, aw, are used, the term "macroscopic curative resection" or "macroscopic non-curative resection" is to be adopted.

17. Number and ratio of gastric resections.

17a. Total number of gastric resections including total gastrectomies and also non-curative resections, and its ratio.

$$\text{Resection ratio} = \frac{\text{Total number of resections}}{\text{Total number of operations for gastric cancer (3a)*}}$$

*can be substituted with total number of out-patients (1) or with total number of admissions (2). The ratio should be defined as such in each case.

17b. Number of curative gastric resections including total gastrectomies and its ratio.

$$\text{Curative resection ratio} = \frac{\text{Number of curative resection}}{\text{Total number of operations for gastric cancer (3a)*}}$$

*can vary from total number of out-patients (1), total number of admissions (2) to total number of resections including non-curative ones (4a). Hence the ratio should be defined as such in each case.

18. Operative mortality and mortality due to resection.

Operative mortality refers to the death within thirty days after surgery regardless of the patient is in the hospital or not.

Those who outlived this period are counted as operative tolerances.

Note:

1) Death after the anesthesia is administered and before the start of operation is counted as anesthesia death, and it is not counted as the direct operation death.
2) Simple laparotomy death is the death after laparotomy but before the start of gastric resection.
3) The death after the start of gastric resection is called a resection death.

The ratio of direct operative deaths is that of the number of direct operative deaths to the total number of gastric cancer operations (3a).

The ratio of direct resection deaths is that of the number of direct resection deaths to the number of resections after (4a or 17a).

19. Late mortality.

This refers to the mortality of patients who have tolerated the operations regardless of them in the hospital or not.

19a. Cases of cancer death.

19b. Cases of death due to other causes (including accidental death)

Cause of death must be recorded.

19c. Cases of death due to unknown causes.

These are dealt with principally as cancer death.

19d. Lost from follow up.

In cases fo patients with no reply to the follow up study, conducted by the census registration and the whereabouts of the patients are still unknown, they are dealt as lost cases.

20. Survival Rate

For calculation of the survival rate, the following data are required.

20a. The survival rate calculated by treating lost cases as dead.

20b. The survival rate excluding lost cases.

20c. The ratio of lost cases.

As to survival rates, the ratios of survivors to the following items are to be calculated i.e.,

20d. Total number of gastric cancer operations of 3a, number of patients tolerating the operation, and number of patients tolerating the operation excluding those deaths due to other causes.

20e. Number of those undergoing resection of 4a (or 17a.), number of those tolerating the resection, and also number of those tolerating the resection excluding those deaths due to other causes.

20f. Number of those undergoing curative resection of 17b., number of those tolerating the curative resection, and also number of those tolerating the curative resection excluding those deaths due to other causes.

In addition, the survival rate is calculated with respect to the following two criteria.

20g. Five-year-survival rate:

$$\frac{\text{Number of patients surviving more than 5 years after surgery}}{\text{Number of patients operated upon more than 5 years previously}} \times 100$$

20h. Ten-year-survival rate:

$$\frac{\text{Number of patients surviving more than 10 years after surgery}}{\text{Number of patients operated upon more than 10 years previously}} \times 100$$

Besides those mentioned above, the survival rates of non-curative resection, anastomosis and simple laparotomy are calculated.

21. Staging of gastric cancer.

The stage is expressed in the following two categories, macroscopic and histologic stages.

In order to obtain the stage, first obtain the corresponding stages of the following items and the highest stage among them will indicate the representative one.

Table 2. Macroscopic stage

Stage	Peritoneal metastasis	Liver metastasis	Lymph node metastasis	Degree of serosal invasion
I	P_0	H_0	N_0	S_0
II	P_0	H_0	N_1N_2	S_1
III	P_0	H_0	N_3	S_2
IV	More than P_1	More than H_1	N_4	S_3

Table 3. Histologic stage

Stage	Peritoneal metastasis	Liver metastasis	Lymph node metastasis	Degree of serosal invasion
I	P_0	H_0	n_0	s_0
II	P_0	H_0	n_1n_2	s_1
III	P_0	H_0	n_3	s_2
IV	More than P_1	More than H_1	n_4	s_3

22. In order to compare the anatomical names of the lymph nodes with lymph nodes listed in Table 1, Table 4, and Fig. 6 and 7 are presented here.

Table 4. Comparison of the name of lymph node used in lymph nodes dissection and anatomical name

No. in Fig. 6	Name of lymph node in gastric resection		No. in Fig. 7	Anatomical name
①	Right cardiac lymph node		1	Lg. cardiaca dext.
②	Left cardiac lymph node		2	Lg. cardiaca sin.
			3	Lg. cardiaca post.
③	Lymph node along lesser curvature		4	Lg. gastrica sup.
④	Lymph node along greater curvature		16	Lg. gast. inf. sin.
			5	Lg. gast. inf. dext.
⑤	Suprapyloric lymph node		6	Lg. suprapylorica
⑥	Infrapyloric lymph node		7	Lg. subpylorica
			8	Lymph node along V. gastroduodenalis
⑦	Lymph node along left gastric artery		9	Lg. coelica sup. sin.
			10	Lg. coeliaca sup. dext.
⑧	Lymph node along common hepatic artery		11	Lg. retropylorica
⑨	Lymph node around celiac artery	(Lymph node at the root of left gastric artery)	12	Lg. coeliaca sup. sin.
			13	Lg. coeliaca sup. dext.
		(lymph node at the root of common hepatric artery)	14	Lg. coeliaca dext.
		(Lymph node at the root of splenic artery)	15	Lg. coeliaca sin.
⑩	Lymph node at splenic hilus		17	Lg. lienaris
⑪	Lymph node along splenic artery		18	Lg. pancreatica sup.
			19	Lg. gastrica post.
⑫	Lymph node in hepatoduodenal ligament		20	Lg. paracholedocus
			21	Lg. paracystica
			22	Lg. hepatica
			23	Lg. retroligamentosa
⑬	Lymph node at posterior aspect of pancreas		24	Lg. pancreaticoduod. post.

14	Lymph node at the root of mesenterium	25	Lg. along superior mesenteric artery among Lg. mesenterica
		26	Lg. pancreatico-duod. ant. inf.
		27	Lg. pancreatica inf.
15	Lymph node around middle colic artery	28	Lymph node in mesocolon
16	Lymph node around abdominal aorta	29	Lg. lumbalis aorticae

Note:

1) Lymph nodes marked with ( ) are not shown in table 1, but they are shown here because they appear at times.
2) The anatomical names of lymph nodes sorrounding the stomach were taken from the following article.
Yosoichi INOUE: Über das Lymphagefässsystem des Magens, Duodenums, Pankreas und des Zwerchfells. Kaibougaku Zasshi (Acta anatomica Nipponica), 9: 33–117, 1936 (in Japanese with German summary).

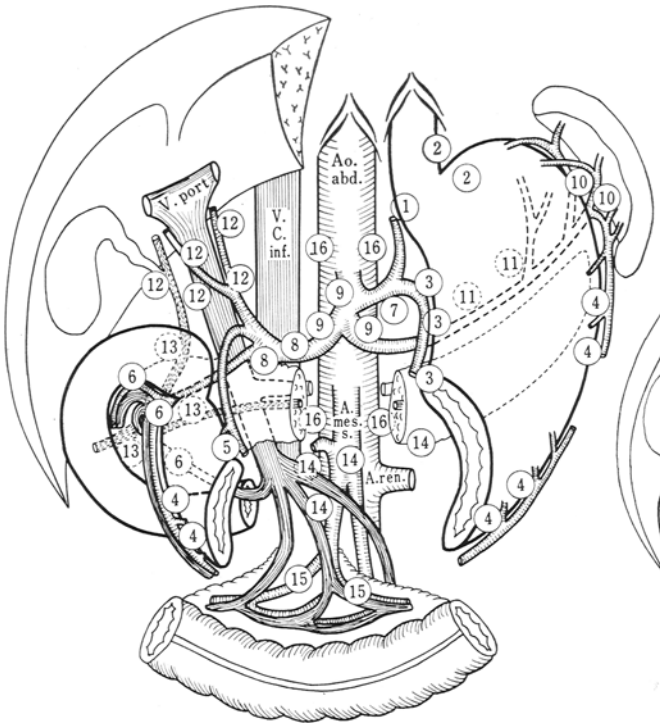

Fig. 6 Diagramm of lymph nodes in gastric resection.

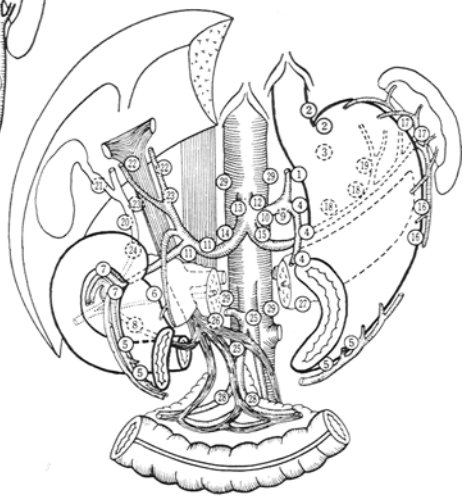

Fig. 7. Anatomical names of lymph nodes according to Inoue (refer to Table 4).