

TUMORS OF THE STOMACH

Arthur Purdy Stout, M. D.

ARMED FORCES INSTITUTE OF PATHOLOGY

TUMORS OF THE STOMACH

TABLE OF CONTENTS

	Page No.
INTRODUCTION.....	9
Table I.....	10
Etiology of Carcinoma.....	10
References.....	12
Gastritis.....	13
Figs. 1-6	
References.....	20
BENIGN TUMORS.....	21
Adenomatous Polyp.....	21
Figs. 7-9	
Gastritis Polyposa.....	21
Figs. 10, 11	
Benign Carcinoid.....	22
Heterotopic Tumors.....	22
Figs. 12-14	
Leiomyoma.....	22
Figs. 15-17, 20	
Granular Cell Myoblastoma.....	46
Figs. 18, 19	
Hemangioma.....	46
Hemangiopericytoma.....	46
Figs. 21-24	
Glomus Tumor.....	46
Fig. 25, Plate IV-B	
Lipoma.....	46
Fig. 26, Plate III-C	
Lymphangioma.....	46
Figs. 27, 28	
Neuroma.....	46
Figs. 29, 30	
Neurilemoma.....	46
Neurofibroma.....	48

BENIGN TUMORS—Continued

Page No.

Fibroma.....	48
Osteoma.....	48
Osteochondroma.....	48
Endothelioma.....	48
Dermoid Cyst.....	48
Teratoma.....	48
Simple Macroscopic Cyst.....	48
Inflammatory Polyp or Granuloma.....	48
Eosinophilic Granuloma.....	48

Figs. 31, 32

References.....	48
-----------------	----

MALIGNANT TUMORS..... 51

Carcinoma.....	51
----------------	----

Epidemiology and Symptomatology.....	51
--------------------------------------	----

Situation in the Stomach.....	51
-------------------------------	----

Fig. 33

Clinical Diagnosis.....	51
-------------------------	----

Figs. 34, 35

References.....	54
-----------------	----

Gross Pathology.....	55
----------------------	----

Fungating Carcinoma.....	55
--------------------------	----

Figs. 36, 37, Plate I-A

Penetrating Carcinoma.....	62
----------------------------	----

Figs. 38, 39, Plate I-B

Spreading Carcinoma.....	62
--------------------------	----

Superficial Spreading Carcinoma.....	62
--------------------------------------	----

Figs. 40, 41, Plates II-B, III-A

Linitis Plastica, Fibrous Carcinoma.....	63
--	----

Figs. 42, 43, Plate II-A

Carcinomas of No Special Type.....	65
------------------------------------	----

Plate III-B

Table II.....	65
---------------	----

Microscopic Pathology.....	65
----------------------------	----

Figs. 44-47

Multiple Carcinomas.....	67
--------------------------	----

Local Spread.....	67
-------------------	----

Figs. 36, 37, Plate IV-A

Metastasis.....	72
-----------------	----

ATLAS OF TUMOR PATHOLOGY

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TABLE OF CONTENTS

	Page No.
INTRODUCTION.....	9
Table I.....	10
Etiology of Carcinoma.....	10
References.....	12
Gastritis.....	13
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References.....	20
BENIGN TUMORS.....	21
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Figs. 7-9	
Gastritis Polyposa.....	21
Figs. 10, 11	
Benign Carcinoid.....	22
Heterotopic Tumors.....	22
Figs. 12-14	
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Granular Cell Myoblastoma.....	46
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Hemangiopericytoma.....	46
Figs. 21-24	
Glomus Tumor.....	46
Fig. 25, Plate IV-B	
Lipoma.....	46
Fig. 26, Plate III-C	
Lymphangioma.....	46
Figs. 27, 28	
Neuroma.....	46
Figs. 29, 30	
Neurilemoma.....	46
Neurofibroma.....	48

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Page No.

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Osteoma.....	48
Osteochondroma.....	48
Endothelioma.....	48
Dermoid Cyst.....	48
Teratoma.....	48
Simple Macroscopic Cyst.....	48
Inflammatory Polyp or Granuloma.....	48
Eosinophilic Granuloma.....	48

Figs. 31, 32

References.....	48
-----------------	----

MALIGNANT TUMORS..... 51

Carcinoma.....	51
----------------	----

Epidemiology and Symptomatology.....	51
--------------------------------------	----

Situation in the Stomach.....	51
-------------------------------	----

Fig. 33

Clinical Diagnosis.....	51
-------------------------	----

Figs. 34, 35

References.....	54
-----------------	----

Gross Pathology.....	55
----------------------	----

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--------------------------	----

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----------------------------	----

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--------------------------	----

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--------------------------------------	----

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Linitis Plastica, Fibrous Carcinoma.....	63
--	----

Figs. 42, 43, Plate II-A

Carcinomas of No Special Type.....	65
------------------------------------	----

Plate III-B

Table II.....	65
---------------	----

Microscopic Pathology.....	65
----------------------------	----

Figs. 44-47

Multiple Carcinomas.....	67
--------------------------	----

Local Spread.....	67
-------------------	----

Figs. 36, 37, Plate IV-A

Metastasis.....	72
-----------------	----

MALIGNANT TUMORS—Continued

Carcinoma—Continued	Page No
Effects of Carcinomatous Proliferation upon the Stomach	73
Fig. 48	
Lesions of the Stomach Simulating Carcinoma	76
References	77
Lymphoid and Reticuloendothelial Tumors	78
Lymphosarcoma	78
Figs. 49–51, Plates V–A, B, VI–A	
Hodgkin's Disease	85
Figs. 52, 53, Plate VI–B	
Plasmocytoma	85
References	87
Other Malignant Tumors	87
Sarcoma	87
Leiomyosarcoma	87
Figs. 54–56	
Fibrosarcoma	87
Liposarcoma	98
Kaposi's Sarcoma	98
Rhabdomyosarcoma	98
Figs. 62, 63	
References	98
Malignant Carcinoid	98
Figs. 57–61	
References	99
Carcinosarcoma and Collision Tumor	99
Figs. 62, 63	
References	99
Involvement of the Stomach by Metastasis and Direct Invasion . .	102
Figs. 64–66	
References	102
TREATMENT	103
Reference	104

TUMORS OF THE STOMACH

INTRODUCTION

The importance of carcinoma among tumors of the stomach is so great that one is tempted to dismiss with a mere enumeration of their names and numbers most of the other tumors which are known to grow there. It would be wrong to do so, for those concerned in diagnosis and treatment cannot proceed with intelligence to meet the unexpected and the unusual unless they are armed with the knowledge of how the tumors may appear and what effects they can produce. This information is especially important for the pathologists who may be called upon to make a quick diagnosis by frozen section. Therefore an apparently disproportionate amount of space in this fascicle is devoted to the rare and unusual tumors.

In oncology are found many peculiar and unexplained facts: None is more bizarre than the distribution of tumor varieties in terms of frequency. The best known and most challenging of these facts is the enormous difference between the relative frequency of carcinoma of the stomach compared with the rarity of carcinoma of the duodenum. This striking fact is further emphasized by the extreme infrequency with which gastric carcinoma invades and replaces the surface of the duodenal mucosa, although it has no such respect for the deeper components of the duodenal wall. Then, too, it is impossible to avoid speculating why adenomatous polypoid growths should be so common in the large bowel and rectum and so rare in the stomach when carcinomas are equally common in both of these portions of the alimentary tract. Why, too, should the mesodermal tissues of the gastric wall, with the possible exception of the smooth muscle, so rarely develop into tumors that in other parts of the body are common? A reference to table I showing the actual numbers of the various tumors of the stomach recorded in the Laboratory of Surgical Pathology of Columbia University will emphasize this. It has been suggested (Šulc; Laidlaw and Murray) that hemangiomas are common in the skin because they are atavistic vestiges reproducing in man the vascular organs for gaseous exchange found in the skin of species which have no lungs. If this is true it is possible that the absence of historical phylogenetic variations may be offered as a partial explanation for the rarity of mesodermal tumors in the stomach. Ontogenetic errors are responsible for very few gastric tumors so far as is known. They are confined chiefly to the occurrence of pancreatic and duodenal

glands in the gastric wall. These glands may become large enough to form small gross nodules (figs. 12-14). Whether or not such buried epithelial cells can develop into malignant tumors is unknown. It has been suggested that they may account for the linitis plastica variety of carcinoma, since this unusual tumor form seems to be largely confined to the deeper layers of the gastric wall; and if the mucosa is involved, it is in its deeper portion, as though the tumor were invading it from the deeper tissues, rather than growing into the wall from the mucosa as in all other varieties of gastric carcinoma.

Table I

651 TUMORS OF THE STOMACH

Laboratory of Surgical Pathology, Columbia University

April 1, 1908 to March 31, 1950

Benign	Tissue of origin	Malignant
Adenomatous polyp.... 32 Gastritis polyposa..... 10 Carcinoid..... 1	Epithelium of mucosa.	Carcinoma... (72.2%) 470 Carcinoid..... 4
Pancreatic adenoma... 6	Heterotopic tissues.	
Leiomyoma..... 39 Granular cell myoblastoma..... 1	Muscular elements.	Leiomyosarcoma..... 24 Rhabdomyosarcoma... 1
Hemangioma..... 0 Hemangiopericytoma... 4 Glomus tumor..... 2 Lymphangioma..... 2	Vascular elements.	Kaposi's sarcoma.... 1
No Cases	Lymphoid elements.	Lymphosarcoma..... 35 Hodgkin's disease.... 4 Plasmacytoma..... 2
Lipoma..... 1	Fatty elements..	No Cases
Neuroma..... 2 Neurofibroma..... 1	Nervous elements.	No Cases
Fibroma..... 0 Inflammatory polyp.... 4 Eosinophilic granuloma 5	Connective tissue.	Fibrosarcoma..... 0
Total..... (16.9%)... 110		Total..... (83.1%)... 541

Etiology of Carcinoma

The etiological factors leading to the development of stomach carcinoma would be of great importance if they were known. It is certain that adenomatous polyps may become carcinomatous, but there are so few of them that they can account for but extremely few cancers. Similarly, hypertrophic or polypoid gastritis and the atrophic changes in the gastric mucosa associated with pernicious anemia have both been considered precancerous. Even if

this is true they are both so uncommon that they can play a part in the development of exceedingly few carcinomas. Pernicious anemia is featured by atrophic gastritis but is by no means the most common cause of this interesting condition. It has been shown that with advancing age the stomachs of many individuals show certain changes in the mucosa, especially of the antrum and pylorus along or adjacent to the lesser curvature. The most striking of these changes is first a conversion of the gastric pits into tubes lined by epithelial cells characteristic of the crypts of Lieberkühn. This process is known as intestinal metaplasia, and in severe cases the gastric glands disappear entirely, leaving only these intestinal type crypts. The second change is the extension of the antral type of mucosa into the fundus for short distances; and the third change consists of the formation of microcysts in the antral and pyloric mucosa (figs. 3, 4). The secretion of acid and gastric ferments in such stomachs may be elevated, normal, or decreased. It has been both asserted (Warren and Meissner) and denied (Guiss and Stewart) that such changes are precancerous. It is true that atrophic changes are very frequent and often marked in stomachs with cancer; but it is difficult to prove that this change is greater and more extensive than is to be expected in individuals of comparable age without cancers, for it is generally accepted that this atrophic change tends to appear in progressively greater extent and frequency with advancing years. It is also hard to prove that carcinomas have developed from glands showing intestinal metaplasia (fig. 6). One is therefore left in doubt about the precancerous importance of atrophic changes in the gastric mucosa.

The relationship of carcinoma of the stomach to chronic peptic ulcer has been hotly debated far beyond its importance. There can be no doubt about the possibility of the coexistence of benign peptic ulcer and carcinoma in the same stomach, but it is equally certain that this is a rare event. Among 470 stomachs resected for carcinoma at the Presbyterian Hospital, N. Y., a chronic peptic ulcer of the penetrating type was found in 34 (7.2 percent). In six of these (1.2 percent) the ulcer was in a different part of the stomach from the carcinoma. In 28 (6 percent) a deep penetrating ulcer which had all of the attributes of a benign peptic ulcer was found to have carcinoma along one margin or completely surrounding the edge, without involvement of the base.

Whatever one chooses to believe about the relationship between these two conditions, whether the carcinoma developed alongside a preceding peptic ulcer or whether peptic ulceration destroyed part of the cancer, leaving only a remnant around its margins (and possibly both processes take place in different individuals), the association is so uncommon that benign peptic ulcer of the stomach cannot be regarded as a precancerous lesion. What is of extreme importance is the fact that it is not always possible by any of the clinical diagnostic procedures at our disposal surely to distinguish the benign from the malign-

nant ulcer of the stomach. It can be stated with assurance that if either hypochlorhydria or achlorhydria is found in patients with gastric ulceration the lesion is more likely to be a carcinoma than a simple peptic ulcer. The reverse is true if there is marked hyperchlorhydria. Gastrosocopy, with or without biopsy, investigation with the roentgen ray, variations in electrical potential as shown in the electrogastragram, and the search for exfoliated cells in gastric washings are all important aids; but none of them is decisive in every case. This need cause no surprise since it is just as difficult for the pathologist with the stomach in his hands always to differentiate between benign and malignant ulceration; and sometimes it is necessary to wait for microscopic examination of multiple sections before diagnosis is certain.

An idea of the relative frequency of the different kinds of gastric neoplasms can be gained from table I, which shows the numbers and kinds of gastric tumors examined in the Laboratory of Surgical Pathology, Columbia University, during a 42-year period. Almost all of these were removed by surgery. The number of benign lesions is probably too high because the only carcinomas counted were those removed by gastric resections. But it is very obvious that even with the inoperable carcinomas excluded, the benign tumors formed only 16.5 percent of the total, and almost all of them were either adenomatous polyps or leiomyomas. It is equally apparent that almost all of the malignant tumors were carcinomas.

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Gastritis

It seems inevitable that the subject of gastritis should be discussed and illustrated in connection with adenomas and carcinomas of the stomach because of the possible relationship existing between the glandular epithelial changes seen in gastritis and the development of carcinoma. Figures 1 and 2 show the microscopic appearance of relatively normal mucous membrane in the antral-pyloric zone and in the fundus. In both areas there are gastric pits lined by mucus-secreting glands; but whereas the pits in the fundus are very short, in the antrum and pylorus they fill the superficial half of the mucosa. In both regions gastric glands fill in the space between the pits and the continuous layer of smooth muscle called the muscularis mucosae; but whereas in the fundus these contain many chief and parietal cells, in the antrum and pylorus there are only a few of these sparsely scattered. Thus the acids and ferments are secreted chiefly in the fundus and but insignificant amounts are formed in the antrum, which is the region where food is prepared for propulsion through the pylorus. The fundic type of mucosa is continued almost to the esophagus but is interrupted for a short distance close to it, where mucosa resembling that seen in pylorus reappears to distinguish the cardia.

The changes of importance in relation to cancer are found especially in the antral and pyloric mucosae. They consist first in an alteration of the character of glands. The gastric pits become lengthened and the cells lining them change from the gastric to the intestinal type; the nucleus and cyto-