PRIMARY SARCOMA OF OMENTUM

REPORT OF TWO CASES

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The rarity, the difficulty in preoperative diagnosis, and the present high mortality warrant the report of two cases of sarcoma of the omentum.

REPORT OF CASES

CASE I: A white married female, aged twenty-nine, had been admitted to the University Hospital three times in two years for uterine bleeding. The last admission, for menorrhagia and metrorrhagia, was three weeks previously. Because of poor response to radiation and endocrine therapy, a hysterectomy was deemed advisable. The abdomen was soft and relaxed; it was not tender and contained no palpable masses. At operation the uterus and appendix were removed and three globular tumors were discovered in the greater omentum and were excised. Exploration of the remainder of the peritoneal cavity revealed nothing unusual.

Pathologic Examination: The uterus and appendix showed no noteworthy changes. The three tumors (Fig. 1), which measured 6, 5, and 3 cm. in diameter respectively, were bluish and of similar appearance. Each was encapsulated, but on the surface of one was a small secondary new growth, also encapsulated. The capsules were very thin. The cut surface was red, pulpy, and granular, and yielded much blood. The surface resembled a sponge, with trabeculae of grayish, granular tissue.

Microscopically the tumors were very cellular. In general the cells were of spindle shape and in the solid portions there was a meshwork of reticulum (Fig. 2). Occasionally the spaces were filled with a thin homogeneous substance resembling mucus. In some areas there were compact strands of spindle cells. The nuclei were vesicular, but few mitotic figures were observed. Pools of blood occurred throughout the section, suggesting a cav-

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FIG. 2. CASE I: SECTION SHOWING RETICULATED APPEARANCE OF TUMOR AND ENDOTHELIAL-LINED SPACE CONTAINING BLOOD. HEMATOXYLIN AND EOSIN. × 250

FIG. 3. CASE I: SECTION OF TUMOR SHOWING COMPACT SPINDLE CELLS AND MANY CAVERNOUS BLOOD SPACES LINED WITH ENDOTHELIUM. HEMATOXYLIN AND EOSIN. × 250
ernous angioma, especially where the cavernous spaces appeared to be lined with flattened endothelium (Fig. 3). The blood in the spaces was well preserved and few recognizable blood vessels were seen in the trabeculae. This suggested circulation of the blood through the large cavernous sinuses.

Histopathologic Diagnosis: Spindle-cell sarcomas of hemangio-endothelial origin, multicentric.

Postoperatively there was some elevation of temperature, which gradually subsided in ten days. The patient was discharged on the twelfth day. Within a few months she began to lose strength rapidly and, despite roentgen therapy, numerous abdominal masses appeared. A total of ten treatments (1750 r units) were given over a period of seventeen months. Recurrent growths became widespread, the patient became cachectic and died eighteen months following operation. Necropsy was not performed.

Case II: A Negro female, aged twenty-six, was admitted to the University Hospital complaining of "peculiar feelings" in the left hypochondrium. These attacks occurred daily, with radiation to the right side and to the back of the neck, and were associated with shortness of breath. Relief was obtained by lying down. Two months previously, at a regular menstrual period, large blood clots had been passed. An attack of lower abdominal pain followed. Since then there had been a gradual increase in the size of the abdomen. The bowel movements "had not been satisfactory."

The abdomen was uniformly distended, rounded and protuberant, and in the upper part was an indefinite fluctuant mass. There was no tenderness. A fluid wave was elicited. Pelvic examination was unsatisfactory because of the abdominal distention. The thyroid gland was slightly enlarged. A systolic murmur could be heard over the entire precordium. The red cell count was 2,350,000 per cu. mm. The Wassermann and Kahn blood reactions were strongly positive. Roentgen study revealed a mass displacing the stomach upwards.

An exploratory laparotomy was performed on the sixth day after admission and the peritoneal cavity was found to contain a quantity of thin bloody fluid. In the omentum and the gastrocolic ligament was a large fluctuant globular tumor, which was removed. Fibrous adhesions bound the liver to the diaphragm. The uterus contained numerous fibromyomata.

Pathologic Examination: The tumor was a circumscribed globular mass 20 cm. in diameter (Fig. 4). Attached to one area was a small, membranous, fat-laden tab, which appeared like omentum. On section, much of the central portion of the tumor was found to be cystic, containing bloody fluid. The cyst wall, where thin, was smooth, but in the thicker areas was granular. The more solid part of the tumor appeared reddish and spongy in some, and grayish and cellular in other areas. Microscopically, the new growth was very cellular, the
cells being of spindle shape and stellate. Anastomotic processes from the cells formed a loose reticulum. Homogeneous material was seen in the mesh-work. In the more spongy areas were large vascular spaces lined by flattened tumor cells. In some areas there were strands and clusters of cells that suggested a new growth of capillaries (Fig. 5). Collections of lymphocytes were scattered throughout the sections. Numerous blood vessels with coats were present in the trabeculae.

**Histopathologic Diagnosis:** Spindle-cell sarcoma of lymphangio-endothelial origin.

Death occurred thirty-six hours after the laparotomy, due to a cardiac thrombus extending into the pulmonary artery.

At necropsy no remains of the tumor could be found and no metastases were seen.

**Discussion**

In 1927 McDonald (1) collected 48 examples of sarcoma of the omentum from the literature. Two years later Mandelstamm (2) added 4 to 49 cases reported up to that time. Ransom and Samson (3), and Sanes and Kenny (4), in 1934, brought the total number to 79. The latest tabulation which we have found is that of Menne and Birge (5), who in 1936 collected 83 cases and added one of their own. Ransom and Samson included 5 cases of so-called "carcinoma" of the omentum, on the assumption that the nomenclature was probably incorrect. This was in part due to the influence of Ribbert, who contended that tumors which arise from entodermal anlagen including endothelial and mesothelial structures should be called carcinoma.

There has been much speculative interest in the origin of sarcoma of the omentum and there is a variety of descriptive terminology on the basis of histopathology. The relative incidence of each type is as follows:

<table>
<thead>
<tr>
<th>Tumor Type</th>
<th>Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spindle-cell sarcoma</td>
<td>17</td>
</tr>
<tr>
<td>Fibrosarcoma</td>
<td>14</td>
</tr>
<tr>
<td>Myxosarcoma</td>
<td>8</td>
</tr>
<tr>
<td>Sarcoma (type not specified)</td>
<td>7</td>
</tr>
<tr>
<td>Round-cell sarcoma</td>
<td>6</td>
</tr>
<tr>
<td>Endothelioma</td>
<td>4</td>
</tr>
<tr>
<td>Alveolar sarcoma</td>
<td>3</td>
</tr>
<tr>
<td>Hemangiosarcoma</td>
<td>3</td>
</tr>
<tr>
<td>Angiosarcoma</td>
<td>3</td>
</tr>
<tr>
<td>Mixed-cell sarcoma</td>
<td>2</td>
</tr>
<tr>
<td>Endothelial sarcoma</td>
<td>2</td>
</tr>
<tr>
<td>Perithelioma</td>
<td>2</td>
</tr>
<tr>
<td>Perivascular sarcoma</td>
<td>1</td>
</tr>
<tr>
<td>Hemangio-endothelioma</td>
<td>1</td>
</tr>
<tr>
<td>Myxofibrosarcoma</td>
<td>1</td>
</tr>
<tr>
<td>Reticular-cell sarcoma</td>
<td>1</td>
</tr>
<tr>
<td>Liposarcoma</td>
<td>1</td>
</tr>
<tr>
<td>Mixed-cell sarcoma</td>
<td>2</td>
</tr>
</tbody>
</table>

It should be noted that a large number of these tumors are thought to have arisen from endothelium. The histopathology of our two tumors is also suggestive of endothelial origin. Several of the cases reported as sarcomas appear from the descriptions to be endotheliomas. Ransom and Samson (3) cited a case in which a hemangiosarcoma was believed to have developed upon a cavernous hemangioma. They point out that several authors, in classifying their neoplasms as spindle-cell or round-cell sarcomas, used descriptive terms strongly suggesting angiosarcoma or endothelioma—for example, "large blood spaces lined by radiating bands of neoplastic cells." They therefore believe that the majority of the neoplasms have their origin from some part of a blood vessel, either from the wall or the endothelium. The lymph vessels may similarly be included, for it has been shown by Simer (6) that these are abundant and accompany the blood vessels in all parts of the omentum.

Menne and Birge (5), in describing the microscopic picture in their case, say: "In the walls of some of these vessels there are radially arranged tumor
cell structures." This description suggests at least a perithelioma, which seems to occupy a position intermediate between sarcoma and endothelioma. Peritheliomas have been given various names—angiosarcoma, perivascular endothelioma, and periendothelioma—adding further to the confusion. The exact origin of the perithelioma is questionable. Roussy (7) recognized it only as a peculiar morphologic structure without histogenetic significance. Ewing (8) believes that it exhibits sarcomatous rather than endotheliomatous characters and should be grouped with the sarcomas. McDonald (1) asserts that, until it is possible to settle the question of the origin of endotheliomas, it would be simpler to consider this group as a variety of sarcoma.

In discussing endotheliomas of the peritoneum, Ewing (8) says that the impression that these tumors have sarcomatous qualities finds support in the observations of Miller and Wynn that connective tissue is sometimes formed by the tumor cells. Hertzler (9) aptly remarks that the attempt to establish a definite picture is made much more difficult by the frequent use of the "straddle term," endothelial sarcoma. The majority of sarcomas described as "alveolar" are said by Ewing to have later been identified as endotheliomas or carcinomas. The so-called "retothelial sarcomas" are said to have their origin in the collections of reticular cells associated with vascular channels.

Our first patient had multiple tumors which appeared to be of the same duration. The encapsulation suggested a multicentric origin. The subsequent growths may have been new tumors rather than true recurrences.
this case the tumors closely resembled cavernous hemangiomas; and from the paucity of well defined arteries and veins within the bodies of the neoplasms it would appear that circulation progressed through the cavernous spaces. We concluded that this tumor was of hemangio-endothelial origin. The tumor from the second patient exhibited a new growth of minute vascular channels and there were many scattered lymphadenoid deposits. We therefore considered this new growth of lymphangio-endothelial origin.

All neoplasms from the omentum do not necessarily arise from the blood or lymph vessels. Greig (10) quotes Tavares and Magano as suggesting that the fibrosarcoma may be an anaplastic reversion of a benign fibroma. Ménétrier regards the fibromatous element as a secondary reaction to the invading sarcoma. Many sarcomas undergo mucoid degeneration and this leads to the term myxosarcoma. More recently, Menne and Birge (5) have pronounced the theory that the majority of sarcomas of the omentum have their origin from the lipoblast. They assert that photomicrographs reproduced in some of the reports are strongly suggestive of a fat-cell origin. In their own case they demonstrated lipoid granules in the cytoplasm of many of the tumor cells. In the several instances reported, however, in which selective fat stains were used, there did not appear to be an undue proportion of fatty material within the tumor. Omental fat which has become incorporated within these growths may be responsible for the fat stain reaction. Sections from the tumors of our patients stained routinely strongly suggest a lipoblastic origin, but fat stains failed to reveal any lipoids.

Sarcomas of the omentum have been classified into two groups, the circumscribed and the diffuse. Both of our cases would fall into the first group, although in the first case the tumors were multiple. The soft consistence of these tumors denotes the cellular structure. They frequently attain tremendous proportions in a relatively short time; they infiltrate but generally appear well demarcated. It is not always easy to distinguish microscopically a tumor from an inflammatory reaction. It is generally recognized that inflammatory reactions in fatty tissues such as the omentum bear a close resemblance to sarcoma. On the other hand, masses which at operation were thought to be inflammatory, have later been proved to be sarcomatous by recurrence and metastasis. Ewing (8) states that many sarcomas show such marked histologic resemblance to inflammatory processes that pathologists have been inclined to accept, in a certain sense, the inflammatory origin of some sarcomas. It has been suggested by McDonald (1) that before a case be accepted as primary sarcoma of the omentum, certain qualifications should be met: (a) The growth should have originated with the omentum. (b) It should be proved histologically and when possible the clinical course should be followed for additional evidence, such as recurrence or extension.

**Clinical Features**

The average age incidence of omental sarcoma is in the fourth decade, though cases have been reported from early childhood to senescence. The ratio of females to males is three to two. The onset is usually insidious, with bizarre abdominal symptoms. The tumor may, however, be found accidentally
before symptoms arise. As a rule there is vague abdominal discomfort with a dragging sensation. Occasionally there is an acute onset with severe abdominal pain, which has been attributed to rupture of one or several vessels with hemorrhage into the peritoneal cavity. Torsion may also produce an acute abdominal crisis with surgical shock, but is infrequent. General malaise, anorexia, loss of weight, nausea, vomiting, constipation, and sometimes diarrhea are the most frequent initial symptoms. Secondary anemia is commonly observed. Fever is an inconstant finding. Abdominal distention is present in more than half the cases. This is due to ascites, which gradually becomes more pronounced, sometimes reaching tremendous proportions. The ascitic fluid is generally of a hemorrhagic nature. Pressure symptoms and partial intestinal obstruction may occur. A remarkable feature in many patients is the absence of cachexia even in a far advanced stage.

Physical examination reveals an abdominal tumor of variable size and contour in more than half the patients. It is usually in the mid-line. In some instances it is mobile and can be pushed from side to side and upward, though, as a rule, it cannot be moved downward. This serves to differentiate it from a primary pelvic tumor. The mass is usually not tender. It is generally little influenced by respiratory movements. When adhesions attach the tumor to some viscus or to the parietal peritoneum, its identification as such is made more difficult. Only three cases have been reported in which the diagnosis was made preoperatively. Differentiation from other abdominal tumors is difficult. Because of its rarity sarcoma of the omentum is seldom considered, even in the operating room.

TREATMENT AND PROGNOSIS

Treatment has not been satisfactory. In 54 of the recorded cases which we studied, the patient was subjected to operation. The postoperative results were reported in 42 instances. Sixteen patients (38 per cent) had recurrences within a few months to two years. Thirteen of the 16 were dead from three months to thirteen months after the appearance of the recurrent growth. Eleven patients died early postoperatively and one died during the operation. The immediate operative mortality is therefore 26 per cent. The total mortality from operation and from recurrence is 64 per cent. In another case there was apparently a recurrence, for paracentesis was required for ascites at frequent intervals. At the end of three years this patient, while still living, was debilitated and anemic. Of the 14 patients reported cured by operation, the majority had been followed for only a few months. In only 3 instances were metastases found at the time of operation. Metastases have been observed at autopsy in the lungs, liver, spleen, intestines, uterus, and ovaries. Implantation metastases in the peritoneal cavity have occurred frequently. The high incidence of recurrence may be due to the mobility of the omentum, which facilitates early implantation. Operative trauma may play an important rôle in distributing implants. Gastric ulcers developed in a number of cases after resection of the greater omentum. This has been explained on a basis of interference with the blood supply.

In view of the early recurrences, the high postoperative mortality, and the small percentage of doubtful cures following operation, excision of these
tumors is of little benefit. X-ray therapy should, if possible, be tried before operative extirpation.

**SUMMARY**

1. Two cases of primary sarcoma of the omentum are added to the 84 cases which have previously been reported in the literature.
2. In both these cases and in many of the reported cases, the tumor apparently arose from vascular endothelium.
3. Preoperative diagnosis is difficult but the possibility of an omental tumor should be borne in mind in the presence of an abdominal mass.
4. The signs and symptoms of omental sarcomas are described. Operative treatment would appear to be of little benefit.

**BIBLIOGRAPHY**


**ADDENDUM**

Since the completion of this paper, we have encountered another primary sarcoma of the omentum, which proved similar in many respects to Case 2.

A white woman, aged thirty-six, mother of two children, had been informed seven years previously that she had a small tumor between the uterus and ovary. Four months before admission a sudden acute pain in the upper left quadrant of the abdomen was followed by cramp-like pains over the entire abdomen. This attack lasted twelve hours and was accompanied by nausea and vomiting. A similar attack of one hour duration occurred two months later and the third, of thirteen hours' duration, led to admission to the hospital. The patient had for four months observed a gradual increase in the size of the abdomen, which was distended, tender, and flat to percussion.

At operation the peritoneal cavity was found to contain about 2000 c.c. of dark bloody fluid. A large tumor, which was attached by a pedicle to the gastro-hepatic ligament at the level of the pylorus, was removed. Vascular adhesions bound the new growth to the anterior surface of the stomach and to the greater omentum.

The tumor was spherical, measuring 21 cm. in diameter, and on section was partly solid and partly cystic. The hemorrhagic necrotic cyst contained 1500 c.c. of bloody fluid and was surrounded by a cellular gray wall varying in thickness from 0.3 to 7 cm. Microscopically the new growth was composed of spindle and stellate cells. Anastomotic processes from the cells formed a loose reticulum enclosing some homogeneous material. Vacuoles of varying size were irregularly scattered throughout. Large spaces, sometimes containing well preserved blood, were observed. These large spaces seemed to represent a confluence of smaller ones.

No sudanophilic material was present. Sections from different areas exhibited a histologic picture similar to that shown in Fig. 2 (Case I). Recovery was uneventful.

*Diagnosis:* Spindle-cell sarcoma.