PRIMARY SARCOMA OF THE GREAT OMENTUM

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Primary sarcoma of the great omentum is a rare disease. Grieg (1) in 1930 referred to 57 authentic cases reported in the literature. In the same year Mandelstamm (2) cited 4 personal cases and analyzed 54 instances as to symptomatology and pathologic anatomy. Additional cases have been recorded by Leinati (3), Strauss (4), and Joachimovits (5).

![Image of tumor]

Fig. 1. Case I: Gross Appearance of Tumor

The following 3 cases are reported because of the rarity of the condition and the illustrative clinical and pathologic features which they present.

Report of Cases

Case 1: Z. N., a student, sixteen years of age, white, Polish, male, was admitted on the service of Dr. Herbert A. Smith, Feb. 16, 1931, complaining of a dull ache in the upper abdomen and loss of weight of several months' duration. A history of occasional diarrhea and epistaxis was also obtained. Two weeks before admission a mass was discovered in the left hypochondrium.

Upon physical examination the patient appeared to be well developed. Both cheeks were flushed. The sclerae showed a subicteric tinge. The abdomen was distended, the epigastrium bulging. Palpation revealed in the left hypochondrium a mass the size of a

1 This paper was read in abstract before the Buffalo Pathological Society, in February 1933.
FIG. 2. Case I: Multipolar cells with anastomosing cytoplasmic processes; one binucleated giant cell in field (Low Power)

FIG. 3. Case I: Abundance of reticulum fibers in stroma, with relation to cells, silver stain (Low Power)
lemon, firm, irregular, and movable. Tenderness was elicited on deep pressure. The character and size of the mass seemed to change on subsequent examinations. Free fluid was present.

The temperature ranged from 99 to 102°; pulse, 110; respirations, 24. Laboratory findings included hemoglobin 85 per cent, white blood count 12,200, with 76 per cent polymorphonuclear leukocytes. The Wassermann reaction was negative. Blood cultures were negative. The stools were negative for blood.

A flat radiographic plate of the abdomen showed dilatation of the small intestine to the left of the spine in the region of the second to fourth lumbar vertebrae, which was considered as evidence of partial bowel obstruction. Peritoneal fluid showed many red blood cells, few polymorphonuclears, and large endothelial cells, but no tumor cells.

During his stay in the hospital the patient suffered several attacks of dyspnea, epistaxis, and cyanosis which was restricted to head and arms. The clinical impression was intra-abdominal abscess of undetermined origin.

Laparotomy (Feb. 12, 1931) disclosed a huge quantity of bloody fluid in the peritoneal cavity. A large circumscribed tumor lying in the great omentum was removed. Postoperatively cyanosis increased; emesis and diarrhea appeared. Death occurred Feb. 18, 1931.

Pathologic Report on Surgical Specimen: Grossly, the specimen consisted of the great omentum, containing a large, soft, irregular tumor measuring 14 × 11 × 12 cm. The color was bluish red. On section the central portion showed extensive recent hemorrhage and necrosis. The growth was distinctly cystic, one cyst having been previously opened. The cysts contained brownish fluid.

Histologically the tumor, though rather uniform in structure, was made up of cells varying widely in shape, size, and character. The predominant cellular type included spindle, diamond, and stellate multipolar cells with a fair amount of pink-staining homogeneous cytoplasm. The cell membranes were imperfectly defined. The nuclei were either central or peripheral, kite-shaped or elliptical. Most of them were hyperchromatic; others were vesicular, containing several small chromatin masses. Radiating from the cells and connecting them were three to six pale yellowish, interlacing, cytoplasmic threads, between which intervened sinusoidal spaces. Scattered in these spaces were lymphoid and plasma cells. Silver impregnation stainproved the strands in the stroma to be

2 Foot and Foot method, variant 2.
reticulum fibers. Mononuclear giant cells with oval and bizarre-shaped vesicular nuclei were observed. The nuclei contained several nucleoli; the remaining chromatin material was arranged in delicate threads. Huge multinucleated cells possessing from two to five nuclei were also seen, sometimes closely packed together. These cells often showed hyperchromatic nuclei, granular and vacuolar cytoplasm, and phagocytosis of red cells. Mitotic figures were numerous. In some areas cells resembled endothelial giant cells with primitive capillaries between them. There was also an abundance of small, thin-walled vessels.

In various parts the tumor showed necrobiosis, hemorrhage and infiltration of polymorphonuclear leukocytes and round cells. Tumor cells were found in vessels.

The diagnosis was reticular-cell sarcoma (reticulo-sarcoma).

Autopsy Findings: The autopsy findings included the tumor remnant in the mesentery; an intra-abdominal fetid abscess between the transverse colon, upper jejunum, and mesentery, communicating with a sinus in the transverse colon; distinct hyperplasia of the abdominal lymph nodes; streptococpic thrombophlebitis of the superior vena cava; older emboli in the pulmonary arteries; several infarctions in the left lung; soft splenic tumor (culture: Streptococcus hemolyticus); marked hyperemia and swelling of kidneys.

Case 2: F. Z., a chauffeur, forty-eight years old, white, German, male, was admitted on the service of Drs. Thew Wright and J. Sutton Regan, Jan. 11, 1932, because of severe abdominal pain of five days' duration. Two years previously the patient had confided to his wife that he thought there was a "tumor" in his lower abdomen. He also complained of recurrent attacks of pain in this region. Five days before admission he was seized with severe pain, which became localized within twenty-four hours to the right lower quadrant. Nausea and emesis occurred several times. Upon physical examination the abdomen was markedly distended. Tenderness was exquisite in both lower quadrants. The percussion note was tympanitic. No mass was found. The temperature was 99°; pulse 100; respirations 22. Laboratory findings included hemoglobin 80 per cent, white blood count 13,400 with 88 per cent polymorphonuclear leukocytes; Kahn test negative. The clinical impression was spreading peritonitis.

Laparotomy (Jan. 11, 1932) revealed about 800 c.c. of foul-smelling, purulent ma-

**Fig. 5. Case 2: Surgical Specimen Showing Nodular Character of Tumor**
terial in the peritoneal cavity. The great omentum was adherent to the anterior abdominal wall and viscera. A small basinful of gray nodular tissue was removed. Bleeding was profuse. Postoperatively fecal drainage developed. The patient died Jan. 23, 1932.

Pathologic Report on Surgical Specimen: The specimen consisted of numerous small nodules of tissue varying from the size of a pea to that of a walnut, weighing altogether 50 grams. The external surfaces of the nodules showed recent hemorrhage. The tissue was rather firm but friable. On section the color was yellowish white; the cut surface glistening. The structure appeared homogeneous.

Histologically, the tumor was made up of bundles and whorls of large spindle-shaped cells, remarkably uniform in size and nature, and compactly arranged. The cytoplasm was pale bluish and clear. The nuclei were fusiform with blunt ends. In many, a prominent central chromatin mass was present; the remaining chromatin material was scattered in very fine granules. Other nuclei took a diffuse basic stain. The interstitial tissue was scanty. Thin-walled vessels were sparsely distributed. In certain portions of the tumor edema separated the cells and fibers. One small area showed distinct necrosis with infiltration of polymorphonuclear leukocytes and round cells and with compression of surrounding fibers. Mitotic figures were seen.

The diagnosis was large spindle-cell sarcoma.

Autopsy findings included sarcomatous adhesions to the mesentery in the mid-portion of the ileum; solitary metastasis in liver; fetid intra-abdominal abscess between loops of small intestine communicating with a sinus in the ileum; fibrinous peritonitis of upper loops of small intestine; bronchopneumonia of both lungs; parenchymatous degeneration of heart and kidneys; diminished lipid content of adrenals; slight atheromatosis of aorta and coronary arteries.

Case 3: A.M., sixty-six years old, a white, American female, was admitted on the service of Dr. Nelson G. Russell, Nov. 14, 1932, because of progressive enlargement of the abdomen for six months. Hicoughs and gastric distress appeared two weeks before admission. The patient was obese, with systolic and diastolic murmurs. The abdomen was markedly distended; superficial veins were dilated; fluid was present; no mass was
felt. The temperature was 98°; pulse 100; respirations 20. Laboratory findings included hemoglobin 75 per cent, white blood count 7,500 with 60 per cent polymorphonuclear leukocytes, Kahn test negative. Abdominal fluid obtained by paracentesis showed many red blood cells, lymphocytes, and mesothelial cells, but no tumor cells. The patient died suddenly Nov. 18, 1832. The clinical impression was peritoneal carcinomatosis or ovarian cyst; arteriosclerotic heart disease with aortic stenosis and insufficiency; pulmonary embolism.

Autopsy Findings: Autopsy revealed papillary endothelioma originating in the great omentum; metastatic dissemination to the mesentery, especially at its intestinal attachment, to the peritoneum covering the gallbladder, parietes, uterus, diaphragm, and to the left pleura; hemorrhagic ascites (12,000 c.c.); dilated veins of abdomen and chest; left hemotorax; multiple emboli in pulmonary artery and branches; chronic cholecystitis with cholelithiasis; small bean-sized leiomyoma of stomach; distinct atherosclerosis of aorta, coronary arteries, and aortic valve (stenosis and insufficiency), and atrophy of ovaries.

The great omentum was suspended across the abdominal cavity like a shelf. Its lateral borders were adherent to the parietes. The omentum was rectangular in shape, markedly thick and firm, measuring 15 x 8 x 1.3 cm. and weighing 150 grams. Its surface was somewhat granular, showing many dilated vessels and petechial hemorrhages. The free edge was rolled and thickened. Upon section the omentum was thickest at the free edge, tapering off in breadth toward the transverse colon. The color was grayish yellow with many yellowish spots and streaks. In a few places the appearance was pseudocystic. Upon pressure milky fluid exuded. The gastrocolic ligament showed no primary growth.

Histologically, the tumor was made up of innumerable spaces, varying in size, lined by single and several layers of columnar and polyhedral cells. In some spaces the lining cells were still flat in nature. The cells did not shrink away from the walls of the spaces. Their cytoplasm was bluish pink, clear, and moderate in amount. The nuclei were elongated or round, usually vesicular but also hyperchromatic. Distinct nucleoli were not seen. The cell outlines were fairly distinct. The lumina of spaces contained no blood but were filled with proliferating papillary growth of heterogeneous cells including, in addition to those already described, small cells with abundant pink cytoplasm, large cells with dark indented nuclei, and polyhedral giant cells with indefinite outlines. There were also fusiform cells of moderate size, with thin cytoplasmic radiations. Silver stains showed scattered impregnated fibers. Cells were distinctly arranged about vessels in both radial and concentric directions. In some places an alveolar structure was observed; psammomatus formations were also seen. In many spaces the central portion of the proliferating growth showed necrosis suggesting a cylindromatous appearance. Mitotic figures were frequent. Tumor cells were observed within vessels.

The diagnosis was diffuse papillary endothelioma.
COMMENT

In reviewing the subject of primary sarcoma of the great omentum for clinical and pathologic statistics, various writers have been perplexed by the number of questionable and obscure cases reported. To prevent future confusion in the literature McDonald (6) recently suggested that in order to be accepted as primary sarcoma of the great omentum a growth must have definitely originated in the great omentum and must be proved malignant by microscopic examination, as well as by evidences of recurrence and extension or metastases. In light of the operative and necropsy findings which they manifested, it is felt that the three tumors here presented satisfactorily fulfill McDonald's requirements.

Grossly, two groups of primary sarcoma of the great omentum have been recognized. The solitary or circumscribed tumor, which is exemplified by Case 1, may be round or oval. The surface is generally irregular. The color is sometimes pale; more often rich vascularization causes a bluish red appearance. Pseudo-cysts filled with brownish fluid result from hemorrhage and necrosis. Hemorrhagic ascites is common. The second group includes rather diffuse omental growths. The majority of these, typified by Case 2, are composed of numerous small and large nodules. Though usually solid, they are rather friable. Metastatic dissemination and non-hemorrhagic ascites occur frequently. Our third case represents a diffuse tumor in which the omentum is markedly thickened throughout but flat. To the omentum in this form the terms "plate" (7) and "shelf-like" are applicable.

The size of the growth may range from that of a grapefruit to a mass weighing 10 kilograms (8).

Upon a histologic basis, practically all types of sarcoma have been
described. In 54 cases Mandelstamm (2) enumerated spindle-cell 16, round-cell 12, fibrosarcoma 6, myxosarcoma 8, polymorph-cell 2, alveolar 2, endothelial 2, lymphosarcoma 2, melanosarcoma 1,⁸ and unclassified 3.

The tumor in our first case bears a timely significance because of the recent histologic studies by Roulet (9), in which he suggested for such growths, the term “retothelial sarcoma” (“retothelsarkom”). Neoplasms of this type are characterized by cells of moderate size with radiating cytoplasmic processes, multinuclear giant cells showing phagocytosis of fat and red cells, and an abundance of reticulum and small vessels in the stroma. Their origin is placed in collections of reticular cells associated with vascular channels. They have been observed in lymphoid tissues, the brain, and pleura. Differentiation must be carefully made from Hodgkin’s disease. Of the omental tumors reported, the two described by Fuss (10) and Heinsius (11) as endothelial and polymorph-cell alveolar sarcoma respectively, appear to be retothelial in nature. It must be mentioned, however, that in both these cases the brevity of the histologic descriptions makes conclusive designation difficult. Our third case is included in the sarcomatous group, following the example of McDonald (6), and upon the basis of Ewing’s classification for similar tumors.

The three patients whom we studied were sixteen, forty-eight, and sixty-six years old. The average age incidence of primary sarcoma of the great omentum lies in the fourth and fifth decades. The oldest patient was sixty-seven years old, reported by Mandelstamm (2); the youngest was four years, reported by Sala (12). Women are more frequently affected than men, the ratio being 3 to 2. In Mandelstamm’s tabulation 30 patients were female and 18 male; in 6 cases the sex was not designated.

The clinical picture of primary sarcoma of the great omentum is varied. From a study of certain case histories, it would almost seem that a latent period of months to years may elapse before symptoms appear. The outstanding initial complaints are pain, mass, and gradual enlargement of the abdomen. While the pain may be a constant dull ache localized to the site of the tumor, it sometimes tends to be severe and recurrent, even radiating to the back and legs (13). The pain has been attributed to hemorrhage, torsion of the omentum, and bowel obstruction (1).

In a great number of cases palpation reveals a fixed mass in the epigastrium, mesogastrium, or left hypochondrium. Dependent upon the structure of the tumor, this mass will feel solid or cystic, soft or firm, smooth or irregular. Changes in size, shape, and consistency may develop under observation. Hertzler (14) remarks that diffuse tumors are less easily demonstrated by palpation than are the nodular, localized types.

Ascites is present in 40 to 50 per cent of cases. According to von

⁸ The primary nature of this tumor (Segouf’s second case) is open to question inasmuch as four years previously the patient had had an eye removed, possibly for sarcoma.
Staplemohr (15) it is bloody in about a third of these. Camus (16) obtained chylous fluid by paracentesis. Among general symptoms may be mentioned dyspepsia, diarrhea, loss of weight (17), and evidences of collateral circulation (18) (dilated veins). The presence of fever (19), cachexia, and anemia early in the disease is inconstant.

The diagnosis of primary sarcoma of the great omentum was correctly made before laparotomy or necropsy in only 3 cases (16, 20, 21). The condition has been mistaken for ovarian cyst (8), fibromyoma of the uterus (22), hepatic cirrhosis (23, 18), wandering spleen (24), pancreatic cyst (25), adnexal tumor (2), cyst of spermatic cord (26), tuberculous peritonitis (27), carcinoma of the colon (28), and hydronephrosis (11).

The peritoneum and liver are the most frequent sites of secondary sarcomatous invasion. Metastases to the mediastinum, intestines, pancreas, and bladder are also known. Occasional complications include acute abdominal hemorrhage with collapse (29), perforation into a viscus (30), and stenosis of the gastro-intestinal tract.

In cases of primary sarcoma of the great omentum death usually results from cachexia and metastases. Patients are reported alive three and seven years (31, 32) after surgical removal of the primary tumor. Early surgical excision might afford a favorable prognosis in circumscribed tumors, such as seen in our first case. The immediate operative mortality is due to shock, embolism, and peritonitis.

Summary

The clinical, operative, and post-mortem findings in 3 cases of primary sarcoma of the great omentum are reported.

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BIBLIOGRAPHY