Intra-Abdominal Non-Chromaffin Paraganglioma *

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SMETANA AND SCOTT [6] in 1951 described 14 cases of a rare neoplasm observed at the Armed Forces Institute of Pathology, which had been collected from several sources, and which they termed malignant non-chromaffin paraganglioma. The condition was characterized by the appearance of a slow-growing, usually painless, occasionally tender, tumor mass located chiefly in the muscles of the thigh or in the retroperitoneal tissues, but originating in some instances in other sites. Males were affected more often than females; the age distribution ranged from nine to 40 years. Weight loss, malaise, fatigability and fever were uncommon and inconstant symptoms. A history of trauma was obtained in six cases. The tumor had a tendency to recur and to metastasize, so that nine of the patients died with metastasis or were known to have metastatic extension, at the time of publication. In four cases there had been no follow up; only one patient remained well with no evidence of malignancy four years after surgical removal of the mass. The duration of the illness varied from 29 to 59 months.

A year later, in 1952, Christopherson *et al.*[3] reported 12 cases of an unusual tumor observed over a number of years. These tumors were also slow in growth and usually painless. They arose from the lower extremities in ten cases and from the tongue and the anterior abdominal wall in the other two cases. Ten of the patients were females and two males; the ages ranged from three to 38, with the highest incidence in the late tens and early twenties. A history of trauma was often recorded, but the authors remarked that it most likely called attention to the tumor rather than preceded it. Five of these patients developed metastasis and five others were free of disease from five to 15 years after surgical treatment. A remarkable feature was the long protracted course in most cases. When metastasis occurred, both in Smetana and Scott's and in Christopherson *et al.* series, the organ most frequently affected was the lung, but extension to lymph nodes, bones, brain, adrenal and subcutaneous tissue was also seen.

Grossly these tumors appeared well encapsulated in the majority of cases. They were firm and on section showed a grayish appearance with a smooth or granular cut surface in which areas of necrosis and of fresh and old hemorrhage were detected.

Histologically they were characterized by large polyhedral, round or ovoid cells with abundant cytoplasm containing acidophilic granules or else presenting a ground-glass appearance. They varied from 15 to 60 micras in diameter and frequently contained basophilic bodies. The nuclei were round or oval, and either vesicular or finely reticulated. Mitosis was rarely seen. The cells were arranged in an organoid manner, forming groups separated from one another by thin connective tissue septa. In some areas the tumor formed ill-defined tubular structures, but no true glands were identified. The cells were poorly cohesive, so that some were loose in the false cavity of the organoid structures. The tumors resemble "granular cell myoblastomas" so

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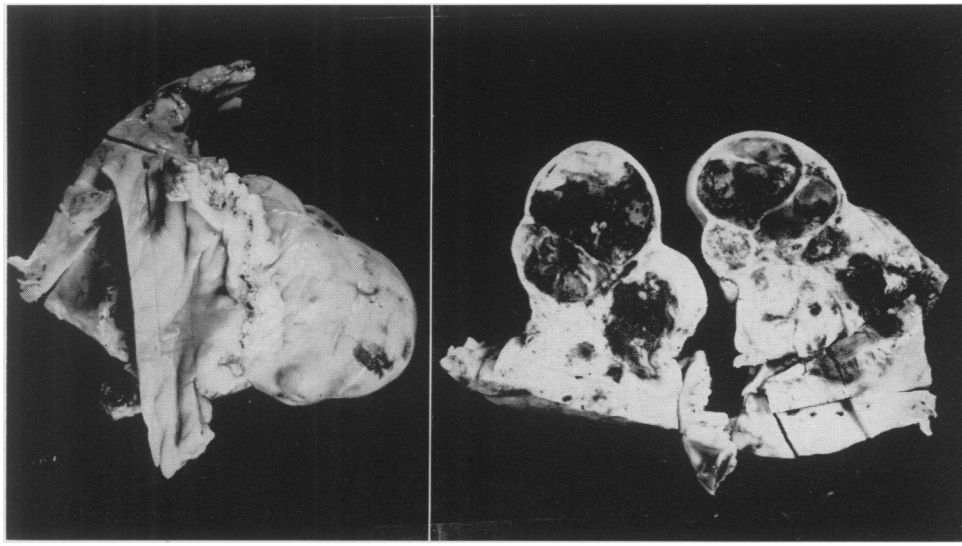


FIG. 1. Gross appearance of the tumor; note lobulation of the surface.
FIG. 2. Cut surface showing the tumor as a well encapsulated mass. Observe the large zones of hemorrhage and the fibrous septa giving it a lobulated appearance.

closely that often in the past, similar instances of this neoplasm have been so labeled. A variety of diagnoses have also been made in this type of tumor, ranging from liposarcoma to amelanotic malanoma. Because of the similarity of this tumor to those known to arise from other non-chromaffin paraganglia, and backed by Johnson's identification of paraganglia in tissues surrounding the large femoral vessels in humans, Smetana and Scott [6] concluded that these neoplasms arise from those structures and thus qualified their classification. Christopherson *et al.*,[3] also called attention to the resemblance of these tumors to non-chromaffin paraganglionic tumors of other locations, but unaware of the existence of such structures in the extremities of man, were hesitant to classify them as such and preferred the noncommital term of "alveolar soft part sarcoma."

Since 1952, two additional cases were reported. One of these, by Black *et al.*,[2] was in a 19-year-old male with a long history of a retroperitoneal tumor. The second one, of Arneill *et al.*,[1] was in a 68-year-old male who had noted a mass six years before he sought medical advice. Following the first resection of the tumor, which was found to be attached to the serosal aspect of the pylorus, the patient had suffered several recurrences with as many interventions. During the last surgical procedure an extensive resection of the intestine was carried out in an attempt to extirpate the tumor in its entirety; the patient was well at the time of their report.

Thus, of the total cases so far recorded, only six originated in the abdominal cavity. Although no paraganglionic glomera have thus far been described in the abdominal cavity of man, Goormaghtigh,[4] Hollingshead [5] and Wislocki [7] have observed them in rats and mice. It is possible that a careful search will eventually uncover them in the abdomen of humans, as they have recently been found in the fascia and muscles around Hunter's canal.[6]

It is because of the rarity of this neoplasm and its unusual location, that we were induced to publish the following case.

CASE REPORT

G. J. F., a colored male, aged 32, was admitted to the Rio Piedras Municipal Hospital on October 11, 1954 complaining of generalized ab-

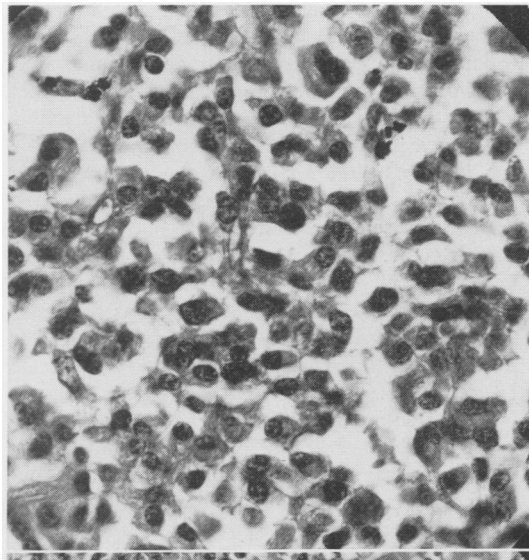
dominal pain, nausea, vomiting and diarrhea of 2 days' duration. The pain was more prominent over the epigastrium and right lower quadrant. He is mentally retarded and thus gave an incomplete and inaccurate history. However, his sister stated that he had been complaining of distressing suprapubic pain for the past 2 years. Physical examination revealed a well-developed, well-nourished, colored male in moderate distress. The blood pressure, pulse and respirations were normal. The temperature was 104.4° F. on admission. The heart and lungs were negative. The abdomen was soft and diffusely tender with decreased peristalsis. A hard, round mass was palpable in the right lower quadrant and these findings were corroborated by rectal examination. Red blood cell count was 4,300,000 and white blood cell count was 16,500. Urinalysis showed traces of albumin, 13 to 14 red blood cells and 13 to 14 white blood cells per high power field. Examination of the feces was positive for occult blood, and eggs of *Trichuris trichiura* and *Necator americanus* were identified. The diagnosis of an appendiceal abscess was made and conservative treatment with antibiotics and supportive measures was instituted. The patient improved during his stay at the Hospital; the temperature returned to normal, the white cell blood count came down to 8,500 and the tenderness subsided. The abdominal mass could not be palpated a week after admission. An interval appendectomy was scheduled for a later date and the patient discharged on October 24, 1954.

He was seen again in the Out-Patient Clinic on November 15, 1954. He gave a history of frequent attacks of abdominal pain, nausea and vomiting since the time of discharge from the Hospital. He was re-admitted on December 6, 1954 complaining of abdominal pain, nausea, vomiting and diarrhea of 2 days' duration. The patient was running a low-grade fever and a mass was again palpable in the right lower quadrant, both on abdominal and rectal examination. Because of fever and other symptoms the intended appendectomy was cancelled, and the patient treated with antibiotics and supportive therapy. He improved markedly and was discharged on December 27, 1954 with the idea of performing an interval appendectomy in three months. A barium enema done at this admission was negative. Chest x-rays and an intravenous pyelogram were also negative. The patient was readmitted on March 25, 1955, with the same complaints as before. He was operated upon the following day when a large, firm, lobulated mass, measuring 10 cm. in diameter, was found in the mesentery of the ileum. A large segment of the ileum and its mesentery along with mass were resected. The appendix was normal. There was no evidence of primary or metastatic disease elsewhere in the abdominal cavity or in the retroperitoneal tissues.

Gross Description. The specimen consisted of several loops of ileum and the corresponding mesentery. The portion of intestine measured 160 cm. in length and 2.5 cm. in diameter, and was uniform throughout. There was moderate congestion of the serosal blood vessels but no exudate was detected. The mesentery showed a lobulated, firm tumor mass measuring $10 \times 7 \times 6$ cm. (Fig. 1). The serosa covering the tumor was thickened in small areas and had a grayish appearance. On section the tumor appeared well encapsulated (Fig. 2); its cut surface showed multiple irregular, hemorrhagic areas, the largest measuring 3 cm. in its largest diameter. Some of these contained areas of dense, gray, firm, tissue separated from one another by intervening fibrous septa. In other parts the tumor consisted of rubbery, pinkish-white tissue. There were numerous moderately enlarged lymph nodes in the mesentery, but they appeared grossly normal. The tumor was not attached to the intestinal wall at any point. The appendix was negative.

Microscopic Examination. The tumor was composed of large, polyhedral, ovoid or round cells (Fig. 3), which towards the periphery of the mass tended to be spindle-shaped. The cytoplasm was abundant and rich in coarse acidophilic granules. The nuclei were round or oval, and clear or vesicular, with a distinct nucleolus. Multinucleated cells or giant nuclei were not seen. Mitoses were not found. The cells tended to be arranged in organoid manner, forming tubular structures composed of loosely packed cells; those cells close to the periphery of the tubules were anchored in the connective tissue. Because of the lack of cohesion some tubules had developed a central cavity where scattered cells were seen. Glandular formation was not seen anywhere. Foci of intercellular edema were identified. At the margins of the tumor the cells were elongated and spindle-shaped as if stretched by the surrounding hyalinized connective tissue capsule. Throughout the tumor there was an abundant network of reticulum fibers disposed about large or small groups of cells and better visualized with silver impregnation stains (Fig. 4). This distribution of the reticulum gave the tumor a striking resemblance to those originating in the carotid body. Occasionally argyrophilic fibers were seen wrapped around individual cells or subdividing a tubular structure into compartments; however, this was rarely observed. Capillary blood vessels were very abundant. Zones of intercellular hemorrhage (Fig. 5), and larger areas of hemor-

FIG. 3.



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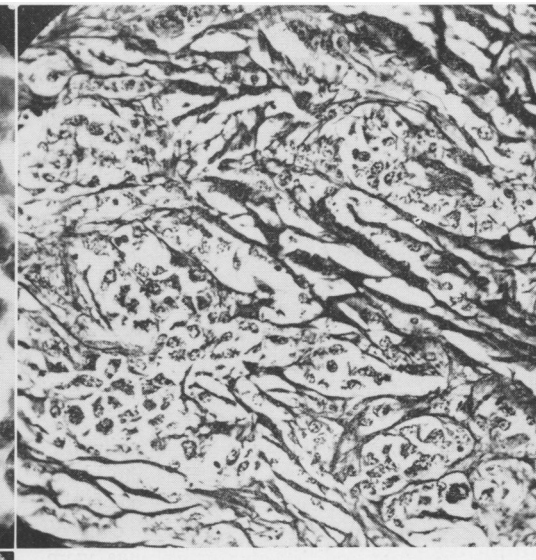

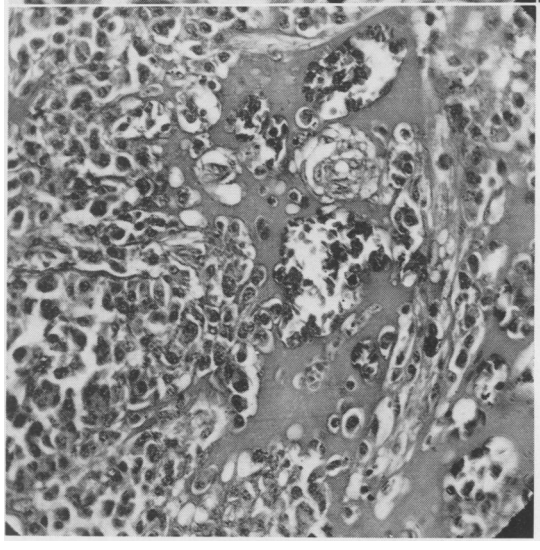

FIG. 3. Large polyhedral cells with abundant acidophilic, granular cytoplasm. Large nucleus and distinct nucleoli are seen in most cells. Hemotoxyline-eosin. × 450.

FIG. 4. Abundant thin and coarse reticulum fibers; note the resemblance to tumors of carotid body. Wilder stain. × 80.

FIG. 5. Depicting a zone of hemorrhage and tubular pattern adopted by the tumor cells. Observe also the lack of cohesion of the tumor cells. Hematoxylin-eosin. × 360.

FIG. 5.

rhage with obliteration of the tumor cells were readily identified. Old hemorrhagic areas were found composed of hyalinized connective tissue with abundant hemosiderin pigment and isolated islands of tumor cells. There was no capsular or blood vessel invasion detected microscopically. The lymph nodes from the mesentery were hyperplastic and contained abundant hemosiderin-laden macrophages. The intestine and appendix were negative.

COMMENT

This patient gave a fairly long history of lower abdominal pain when he first sought medical advice. We feel that the episodes of abdominal pain and the transient elevations in leukocytic count, as well as the symptoms of peritoneal irritation, were the result of intra-tumoral hemorrhages occurring at intervals of time as demonstrated histologically.

Our decision to classify this neoplasm as a non-chromaffin paraganglioma was based on the histologic characteristics, which were identical to those of the tumors described by Smetana and Scott.[6] Based on the natural history of malignant non-chromaffin paragangliomas, the prognosis in this case must be guarded. Their tendency to recur, even after apparently total excision, their slow growth and late metastasizing power, lend support to this thought. However, the fact that a number of cases have

been cured by radical operation lends a good deal of hope to the outcome of this case. Although it is only eight months after the operation, the patient has no evidence of recurrence and, except for complaints related to the extensive resection of the small bowel, namely diarrhea, he feels well. There exists the possibility of this being a malignant pheochromocytoma; they have been described in this location and those less differentiated may give no hypertensive symptoms. However, the general pattern in our case is, histologically, unlike that of pheochromocytoma.

There was no evidence of a primary tumor elsewhere in the abdomen, nor evidence of metastases, either in the regional lymph nodes or distant organs.

SUMMARY

A case of a non-chromaffin paraganglioma of the mesentery in a 32-year-old male, is recorded. This represents the seventh case of such a neoplasm occurring in the abdominal cavity. A short comment on the natural history and histogenesis of the tumor is given.

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