CARCINOMA METASTASES TO HEART AND SUBCUTANEOUS TISSUES

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Because of the rarity of both cardiac metastases and metastatic deposits in the skin and subcutaneous tissues, the following case is considered worthy of report.

CASE REPORT

J. W., a coal miner, aged fifty-three, was admitted to the hospital Sept. 29, 1932, complaining of pain in the abdomen, loss of appetite, and vomiting. The onset of the illness was given by the patient as a year earlier, when he was obliged to give up work in the mines because of severe pain in the epigastrium and the lower anterior mid chest. He complained of a sense of heavy, constant pressure in the epigastrium and vomiting following meals. At times the vomitus contained bright red blood. Soft and liquid foods were more easily tolerated. There had been a loss of weight of 36 pounds in the past year, the present weight being 118 pounds. A physician was first consulted two months before.

The patient had worked in mines regularly for the past twenty-eight years, since his migration from Poland. He had never been ill and knew nothing of his family history. He was a moderate user of alcohol and tobacco.

The only physical findings of significance on admission were pain in the upper right abdomen on palpation and muscle rigidity in this area. There was no palpable mass.

No roentgenograms were taken at this time. The blood count showed: red cells, 5,020,000; hemoglobin 90 per cent; white cells 20,000 (polymorphonuclears 89 per cent; large lymphocytes 1 per cent; eosinophils 1 per cent; small lymphocytes 7 per cent; transitionals 2 per cent). The urine gave an acid reaction and was of amber color; the specific gravity was 1.033, and a trace of albumin was present. It was negative for sugar, granular casts, pus, and blood cells.

The patient was put to bed, placed on a liquid diet, and given aspirin for pain. He improved for a few days, after which the pain recurred. He was first seen on the authors' service Nov. 15, 1932, six weeks following admission. He was quite uncomfortable, very emaciated, and was vomiting regularly after every attempt to take nourishment.

The scalp showed several hard, subcutaneous nodules in the deeper layers, movable with the skin. There was marked gingivitis, and the teeth were poor. In the neck were many enlarged hard nodes in both the posterior and anterior regions. The lungs were clear to auscultation and percussion. The heart was not enlarged, and rate and rhythm were normal.

There was a large, hard, tender, palpable mass in the epigastrium, extending from the nipple line on the left side, just beyond the xiphoid process, and down to the umbilicus. The mass was irregular in shape and seemed quite fixed. There was dullness on percussion. The liver and spleen were not palpable. The inguinal nodes were enlarged.

The skin was very rough, due to myriads of subcutaneous nodules, most abundant over the anterior and posterior surfaces of the chest, extending down the arms as far as the elbows, involving the face, scalp, and upper abdomen. Only an occasional nodule was found on the abdomen below the level of the umbilicus. There were many nodules on the legs, extending down to the knees, and in the left axilla and over the back. In one area, measuring 5 x 7 inches, over the posterior left chest, 475 nodules were counted.
They were attached to the skin and deeper structures, were firm, but not tender, and showed no evidence of ulceration. The blood pressure was 110/80.

The patient stated that the first nodule had appeared about the time of his admission, six weeks previously. He indicated a nodule measuring about half an inch in diameter in the right lower quadrant of the abdomen, immediately below McBurney’s point, as being the first one to be observed. A few days after discovering this, he had noticed a few on the anterior left chest. For the past month the nodules had increased rapidly in number and size. Each morning an additional shower would be discovered in some area which had been free the day before.

A diagnosis of advanced carcinoma of the stomach with multiple subcutaneous metastases was made. The subcutaneous nodule in the right lower abdomen, the one first noticed by the patient, was excised, and the pathologist’s report was metastatic carcinoma.

A roentgenogram, taken Nov. 20, showed a marked filling defect at the cardiac end of the stomach with retention of barium in the lower half of the esophagus after two hours. Roentgenograms of the chest, vertebrae, and long bones showed no evidence of metastases. It was impossible to obtain a gastric analysis, because the patient could not swallow the tube.

The blood count at this time was as follows: red cells 3,900,000; hemoglobin 77 per cent; white cells 16,600 (polymorphonuclears 88 per cent; large lymphocytes 3 per cent; small lymphocytes 6 per cent; transitionals 3 per cent). The urine showed a heavy trace of albumin, also hyaline and granular casts. Stools were positive for occult blood. The blood Wassermann reaction was negative.

Dysphagia gradually progressed. The patient was given colonic feedings and also small amounts of liquids by mouth. The pulse became weak and intermittent, and death occurred Nov. 28, 1932.

Autopsy was done by the authors. The body was five feet, five inches in length, anemic and emaciated; the weight was eighty-three pounds. The scalp and skin, as noted in the physical examination, were very rough due to the presence of multiple subcutaneous nodules (Fig. 1).

Incision was made from the manubrium sterni to the symphysis pubis. The flaps were dissected back, and many hard nodules were found infiltrating through the recti and pectoralis muscles and into the subcutaneous tissue. The pleura was studded with nodules, and there were many nodules in the chest wall. The lungs showed marked anthracosis, but numerous small cut sections revealed no nodules here.

The pericardium was covered with metastatic nodules. Several were found at the base of the aorta and in the walls of the left ventricle (Fig. 2), the largest one, at the...
apex, measuring one inch in diameter. There were also several nodules in the right auricle (Fig. 3).

The peritoneum, mesentery, and a large part of the small intestine were studded with small nodules, varying in size from one eighth to one half inch in diameter. The lower border of the right lobe of the liver was bound down in a mass to the anterior portion of the stomach. The liver was small, weighing only 1200 grams. It was studded with metastatic nodules, ranging in size from one to three inches in diameter. Practically the entire parenchyma was replaced by these carcinomatous nodules, many of which had undergone degeneration and were filled with a milky semi-solid substance. Projecting into the cavities of these nodules were papillomatous growths of malignant tissue. The gallbladder was matted down and adherent to the stomach. It was first thought to contain stones, but on being opened revealed a number of firm, whitish nodules attached to the mucosa.

The stomach was adherent in a dense mass posteriorly to the pancreas and prevertebral tissues. It was dissected with the esophagus, a large portion of the adherent pancreas, and prevertebral glands. The stomach was markedly deformed, hard, and nodular, practically the entire organ being involved in a carcinomatous mass. There was an obstruction at the esophageal orifice (Fig. 4), the lumen permitting only the passage of a probe.

An occasional nodule was found on the kidney capsule but cut sections of the kidneys showed no parenchymal metastases. Nodules studded, but were confined to, the capsule of the spleen. The bladder and prostate were negative.
Gross Pathology: Massive carcinoma of the stomach with an obstruction at the esophageal orifice; metastases to the pleura, chest wall, pericardium, myocardium, pancreas, gallbladder, liver, spleen, kidneys, small intestine, peritoneum, mesentery, and subcutaneous tissues; marked emaciation and anemia.

Microscopic study of the sections showed adenocarcinoma of the stomach (Fig. 5), the pathological picture being reproduced in the metastatic nodules.

Discussion

Cardiac metastases are not mentioned in text-books. A review of medical literature, however, yields a number of authentic cases, with the primary growth located as follows: in the stomach (1), esophagus (2), mamma (3), uterus (4), rectum (5), liver (5), vulva (6), thyroid (7), penis (5), skin (8), prostate (9), bronchi (10), gallbladder (5), kidney (5), tongue (11), choroid (12), extremities (12), bones (13), ovary (12), testicle (14), cheek (12), parotid (12), submaxillary gland (15), and pancreas (16). Among the 150 cases collected, the lungs, esophagus, breast, and stomach were most frequently the primary site. These statistics are of little significance, however, because of the high incidence of primary carcinoma in these organs. It would appear that malignant growth in any site may metastasize to the heart.

The incidence of cardiac metastasis in carcinoma, as computed from autopsy findings, ranges from .02 per cent (Thorel, quoted by Blumensohn) in 3,000 autopsies, to 3.15 per cent in 1078 cases (Blumensohn, 5). A collection of autopsy series of carcinoma cases gives an incidence of 0.4 per cent. This figure compares favorably with 0.28 per cent as computed by Nicholls (18). Reichelman (quoted by Blumensohn), in a large series of cases of carcinoma of the stomach, estimated the frequency of secondary deposits to the heart from that organ as 0.96 per cent.
The heart may become involved by direct extension, or by metastasis through the lymph stream or the blood stream. The lymphatic route seems the most common, as is evidenced by the relative frequency of cardiac involvement in lesions of the esophagus, mediastinum, lungs or pleura, as well as the predominance of secondary deposits on the pericardium. The tracheobronchial lymph nodes drain the pleura, lungs, myocardium and pericardium, making possible retrograde invasion from the lungs and pleura. The rapid cardiac vascular flow, and the fact that the coronary arteries come off at right angles to the axis of the aorta, make remote the probability of foreign matter gaining entrance to these small vessels. Simpson (19), however, reports a case in which carcinoma cells were found in the center of mural and valvular cardiac thrombi, and strands of tumor cells in the lumens of coronary vessels, without metastatic nodules in the heart muscle. One of the

![Fig. 5. Photomicrograph of primary tumor in the stomach](image)

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<thead>
<tr>
<th>Carcinoma Cases</th>
<th>Secondary Metastases to Heart</th>
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<tbody>
<tr>
<td>Blumensohn (5)</td>
<td>1078</td>
</tr>
<tr>
<td>Ely (5)</td>
<td>2181</td>
</tr>
<tr>
<td>Willigk (17)</td>
<td>4547</td>
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<tr>
<td>Kohler (18)</td>
<td>9118</td>
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<tr>
<td>Pic and Bret (5)</td>
<td>1708</td>
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<tr>
<td>Thorel (5)</td>
<td>3000</td>
</tr>
<tr>
<td>Bryant (17)</td>
<td>2942</td>
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Total: 24,554

96 (0.4 per cent)
authors has made a similar observation in a case of primary gastric carcinoma.

Little mention is made in the literature of symptoms which would lead a clinician to suspect cardiac metastases. Fishberg (20) reports a case with auricular fibrillation and flutter, in which autopsy showed metastatic growths of the right auricle and widespread metastases in other organs. These symptoms are due to the mechanical effects of pressure, disturbance of the cardiac conduction mechanism by changes in muscle fibers, occlusion of coronary vessels, and the production of multiple emboli, valvular insufficiency, or stenosis by pedunculated grafts or free tissue masses in the heart cavity.

Bodenheimer (21) calls attention to the following symptoms, which, however, are common to cardiac disease in general: precordial pain, palpitation, sense of oppression, dyspnea, cough, hemoptysis, cyanosis, edema of the extremities, effusions into various serous cavities, giddiness, syncope, and attacks of unconsciousness.

Metastases to the skin and subcutaneous tissue are also rare. Kaufmann-Wolf (22) after an exhaustive study could collect only 65 case reports. In 30 per cent of these the primary tumor was in the stomach. No cases were included in which the primary growth was located in the breast. Dürbeck (23) quotes the following autopsy statistics.

<table>
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<tr>
<th>Carcinoma Cases</th>
<th>Metastases in Skin</th>
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<tbody>
<tr>
<td>Heimann</td>
<td>20,000</td>
</tr>
<tr>
<td>Redlick</td>
<td>496</td>
</tr>
<tr>
<td>Loeper and Turpin</td>
<td>2,000</td>
</tr>
<tr>
<td>Millecki</td>
<td>487</td>
</tr>
<tr>
<td>Kitain</td>
<td>452</td>
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23,435          26 (.0117 per cent)

We believe, however, that skin metastasis is much more common than the statistics would indicate.

Uhlenbruck and Gilardone (24), reviewing the literature in connection with a report of a case, added a few cases described as especially noteworthy because of multiple metastases in the skin. Oldham and McGibbon (25) mention a case of intrinsic laryngeal carcinoma in which 58 subcutaneous nodules were removed. Loeper and Turpin (26) describe a case of carcinoma of the stomach with 14 metastatic nodules in the skin, one the size of a mandarin orange.

Involvement of the skin and subcutaneous tissues may occur by the lymphatic route, blood stream, direct extension, implantation at operation, and as Furuta (27) states, by nerve paths as a special portion of the lymphatic system. Most writers agree that the lymphatic route is the most common mode of extension, except for distant metastases, which are no doubt hematogenous in origin.

Subcutaneous metastases occur most frequently on the abdomen, about the umbilicus, by way of the round ligament and usually secondary to carcinomatous nodules in the liver. As with cardiac metastases, subcutaneous nodules are usually a part of a generalized carcinomatosis. In most of the cases reviewed, metastases were confined to skin
on the abdomen, and with the exception of the cases mentioned above, only a few nodules were present.

Metastatic nodules in the skin produce no symptoms unless pressure necrosis occurs; they are usually small and are discovered by accident. When nodules are present, excision should not be neglected, for the primary tumor may sometimes be determined by a study of the histologic picture of the metastatic nodule.

**Conclusions**

1. Metastatic carcinoma of the heart and subcutaneous tissues is rare, but may occur in cases of carcinomatosis.
2. Metastatic tumors of the heart have never been diagnosed prior to autopsy.
3. Despite large metastatic nodules in the heart, cardiac symptoms may be absent.
4. Biopsy of a skin nodule is a legitimate and valuable diagnostic procedure.

**References**