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Angiosarcoma of the Liver Following Vinyl Chloride Exposure

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• Recently, angiosarcoma of the liver has been found in six workers exposed to vinyl chloride. This relationship has never been recognized. (JAMA 229:53-54, 1974)

THE B. F. Goodrich plant in Louisville, Ky, has recently, voluntarily and admirably, released the information that several of their employees exposed to vinyl chloride have died of angiosarcoma. This has been a unique situation.

Report of Cases

Case 1.—The patient, a 44-year-old man who had worked in the vinyl chloride area for 15 years, was first admitted to the hospital on Aug 20, 1967, with an enlarged spleen and liver. Roentgenography of the upper gastrointestinal tract, angiography, and a bone marrow biopsy were performed. On Aug 25, he was transferred to another hospital for surgery. The diagnosis at that time was carcinoma of the liver. The patient had a sympathectomy on Sept 5, and a vagotomy with pyloroplasty on Sept 9. On Oct 2, he underwent splenectomy, aspiration of a liver "hematoma," and a wedge resection of a liver tumor, which was diagnosed as angiosarcoma. Chemotherapy by intra-arterial infusion began on Oct 5, and was repeated on Nov 27, and Dec 12. The patient died on Jan 7, 1968, and diagnosis of angiosarcoma of the liver was confirmed at autopsy.

Case 2.—A 38-year-old male worker, who had worked with vinyl chloride for 16

years, was first admitted to the hospital on Jan 5, 1970. He complained of general weakness and had a history of tarry stools. The working diagnosis was bleeding gastric ulcer. He responded well to conservative treatment and was released. He was readmitted in March 1970. At exploratory laparotomy on March 5, a diagnosis of cancer of the liver was made. The patient died Sept 27, 1971. Gross and microscopic examinations at autopsy confirmed the diagnosis of angiosarcoma of the liver.

Case 3.—This male worker, 50 years of age, was first admitted to the hospital in 1964; he had worked in the vinyl chloride area for 17 years. The diagnosis at that time was a bleeding gastric ulcer. He responded well to conservative treatment and was released. He was again hospitalized on May 10, 1965, with the same diagnosis. At surgery, no ulcer was found. A portal shunt was performed, and an open liver biopsy specimen was taken. A diagnosis of toxic hepatitis resulting from "chemicals" was made. Gallbladder surgery was performed Oct 19, 1970. The patient died on March 3, 1973. At autopsy, a diagnosis of angiosarcoma of the liver was made on the basis of gross and microscopic evidence.

Case 4.—Another male worker, in the same plant for 28 years, was first admitted to the hospital on July 15, 1973, when he was 58 years of age. He had hepatosplenomegaly of unknown causation. On Aug 23, an exploratory laparotomy was performed. Multiple biopsy specimens of the liver were taken as well as a specimen

of a peripancreatic node. Inflammation, consistent with cholangitis in the ascending duct, was observed. The patient died on Dec 19. Diagnosis at autopsy was angiosarcoma of the liver.

Case 5.—The patient, a 52-year-old man, had worked in the vinyl chloride area for almost 20 years. He was first admitted to the hospital in January 1964. The diagnosis on admission was cholecystitis. He had had vague pain in the right upper quadrant for some time, but no other complaints. At surgery, a mass was discovered in the dome of the liver. It was thought to be a hematoma and an attempt was made to drain it. Further investigation showed metastasis to both lungs. The case was complicated by intrapleural hemorrhage. Death on April 4, 1964, was attributed to cardiac tamponade. At autopsy, diagnosis of angiosarcoma of the liver with widespread metastasis was made. Both lungs, as well as the heart and bowel, were involved. Microscopic examination of liver tissue from outside the area of the tumor showed "minimal hepatitis."

Case 6.—The patient, a 47-year-old man, was hospitalized in February 1974. He complained of vague pain in the right upper quadrant. Examination in the company laboratory showed an elevated level of lactic dehydrogenase, type 4. On admission to the hospital, concentrations of lactic dehydrogenase and serum alkaline phosphatase were elevated. Chest roentgenogram and lung scan were normal. Results of the liver scan were questionable. On the basis of the man's work history, it was decided to perform an open biopsy of the liver. The liver was large and widely involved with neoplasm, the main mass being in the dome of the liver. The tumor appeared to be confined to the liver itself. Microscopic examination of the biopsy specimens demonstrated angiosarcoma of the liver. The

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