Technetium-99m HSA Blood Pool Scan in Diagnosis of an Intracardiac Myxoma

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The radioisotope blood pool scan is a recognized test for the presence of pericardial effusion (1,2) and it has been employed in the differential diagnosis of midline thoraco-abdominal masses (3) to decide whether aneurysmal blood pools were present or not. Radioisotope scans have also been used to show detail within blood pools; we have demonstrated clot within aneurysms (3), and Meek, et al (4), have visualized intraventricular clots. To our knowledge, however, there had been but one opportunity to employ blood pool scanning in the diagnosis of an intracardiac tumor (5) until we encountered the case described in the following report.

The patient was a 58-year-old American Indian woman who had been treated for four years in our Out-Patient Clinic for an undiagnosed illness manifested by increasing liver enlargement, thrombocytosis to 900,000 platelets/mm³ and mild hypertension controlled by drugs. She was known to have been a rather heavy drinker. Two years before her final admission to Parkland Memorial Hospital, the patient began to lose weight until weight loss amounted to almost 50 pounds. One year before admission, she began to experience right chest pain of an intermittent, sharp character which was aggravated by lying down and relieved by assuming a prone or upright position. Early in the course of the disease, chest roentgenograms (Fig. 1A) had shown the lung fields to be clear and the cardiac silhouette to be essentially normal in size and shape, but films made after the onset of chest pain gave early evidence of enlargement of the silhouette.

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By the time of her admission in February, 1966, there was a readily identifiable and highly significant increase in silhouette size, without any other positive radiographic finding (Fig. 1B).

Admission physical examination showed distended and pulsating neck veins and hepatomegaly, with the liver edge palpable 5 cm below the right costal margin. Otherwise the physical findings were those which one might expect to find in a woman of late middle age who was chronically ill. By stethoscopic auscultation there was no definite evidence of cardiac murmurs, but a phonocardiogram revealed a diastolic rumble over the xyphoid process and an early systolic murmur as well. Electrocardiographic changes were a generalized decrease in voltage and inversion of the T-waves in leads II, III, AVF, V, through V4.

Among the various diagnostic tests performed was a needle biopsy of the liver, which showed only passive congestion. On March 28, 1966, the patient was referred to the Radioisotope Laboratory with a diagnosis of probable pericardial effusion. A blood pool scan (Fig. 2) was performed in the usual manner, using 2.5 mc Tc99m-labeled human serum albumin (6,7) as the tracer. The scan did not assume the typical pattern of detectable pericardial fluid (1,2,7) however, but instead showed a defect within the heart blood pool proper. The defect was oval in configuration and measured approximately 8 x 5 cm. It obviously did not represent an artifact, nor could any explanation for this finding be adduced from a study of chest roentgenograms. It was therefore concluded that the defect represented a space-occupying lesion within the heart. Diagnostic possibilities included a large thrombus and an intracardiac tumor. In view of the pa-

![Fig. 1a. (left). PA chest roentgenogram of 5-11-64 shows normal cardiac silhouette.

Fig. 1b. (right). PA chest roentgenogram of 3-25-66 shows significant increase in the size of the silhouette. It is now beyond the upper limits of normal by measurement.](image)
Patient's history, the latter seemed the more likely possibility, and a diagnosis of probable intracardiac myxoma or rhabdomyosarcoma was made. Contrast angiocardiography was advised.

On April 1, an intravenous angiogram was performed in the usual manner, using 50 ml of 80 percent sodium iothalamate as the contrast material. Selected films (Fig. 3A & B) show an intracardiac space-occupying lesion, the smooth margins of which are well-delineated by contrast material. Thus, the findings of the blood pool scan were confirmed.

An exploratory operation was undertaken and when the pericardial sac was opened, it was found to contain from 60 to 80 ml of straw-colored, clear fluid. Both the superior and inferior vena cava were observed to be distended. The right ventricle seemed moderately enlarged, but the surgeon felt that the left ventricle was normal in appearance. The right atrial wall was incised within the chamber, a tumor mass was seen arising from a short pedicle near the orifice

Fig. 2. Blood pool photoscan made after the injection of 2.5 mc. Technetium 99m-labeled human serum albumin as tracer. Note the large, rounded area of diminished activity within the right side of the heart blood pool. This phenomenon was interpreted as evidence of the presence of an intracardiac space-occupying lesion.
of the inferior vena cava. The mass occupied most of the right atrial cavity and extended into the right ventricle without evidence of attachment to the tricuspid valve or to the wall of the ventricle. The valve itself was almost completely occluded by the mass, but there was no evidence of extension into the pulmonary artery. A patent foramen ovale was observed. The tumor pedicle was divided at its base, and the operation was concluded with routine closure.

When the pathologist examined the specimen, it was found to constitute an encapsulated tumor weighing 160 grams and measuring $9.5 \times 4.5 \times 4.8$ cm. It was dark purple in color, had a slightly lobulated surface and was rubber-soft in consistency. Microscopically, the tumor was made up of loose connective tissue in which were observed a large number of red blood cells and platelets. The myxoid background of the tumor contained cells of the chondroblast and the chondrocyte series. No mitotic figures were identified. The final histologic diagnosis was benign myxoma.

**CONCLUSION**

An intracardiac myxoma was demonstrated as a filling defect within the right side of the heart blood pool on a scan performed with Technetium 99m-labeled human serum albumin. The correct diagnosis was suggested preoperatively on the basis of scan and angiographic findings, and was confirmed by cardiotomy and histologic examination.

Progressive increase in the size of the cardiac silhouette unaccompanied by increase in the pulmonary vascular volume suggests the need for a blood pool scan, not only to detect pericardial effusion, but the occasional intracardiac neoplasm.

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**Fig 3a.** (left). AP intravenous angiocardio gram film shows contrast material surrounding a right atrial filling defect, which is generally enclosed within the curved dotted line.

**Fig. 3b.** (right). Left posterior oblique intravenous angiocardio gram performed with a second injection of contrast material likewise shows a large filling defect within the right atrium, which lay within the general area enclosed by the curved dotted line. The filling defect may extend into the right ventricle.
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REFERENCES


AEC NAMES ITS ADVISORY COMMITTEE ON MEDICAL USES OF ISOTOPES

Chairman Glenn T. Seaborg of the Atomic Energy Commission announced the appointment of Dr. Robert J. Shalek of Houston, Texas, and Dr. John E. Christian of Lafayette, Indiana, as additional members of the Commission’s Advisory Committee on Medical Uses of Isotopes.

The Advisory Committee was established by the AEC in 1958. It advises the Commission and the AEC Director of Regulation on matters relating to policies and standards for the regulation and licensing of medical uses of radioisotopes in humans. The Advisory Committee replaced the Subcommittee on Human Applications, which was established in 1948, as part of the Advisory Committee on Isotope Distribution. Under the present system of rotation of membership, the terms of the members run for five years and two members are replaced each year.

Dr. Robert Shalek is an Associate Physicist at the M. D. Anderson Hospital and Tumor Institute, University of Texas, Houston, and a consultant for the Oak Ridge Institute of Nuclear Studies. Dr. John Christian is Head of the Bionucleonics Department of Purdue University, Lafayette, Indiana. The new members replace Dr. Edith Quimby and Dr. Donald Childs who have retired from the Committee.

Other members of the Advisory Committee are: Dr. Wallace D. Armstrong, Professor, Department of Biochemistry, University of Minnesota, Minneapolis; Dr. Reynold F. Brown, Member, Department of Radiology, University of California Medical School, San Francisco; Dr. John A. D. Cooper, Dean of Sciences, Northwestern University Medical School, Chicago; Dr. Robert H. Greenlaw, Associate Professor of Radiology, University of Kentucky, Lexington; Dr. E. Richard King, Professor of Radiology, Medical College of Virginia, Richmond; Dr. George V. LeRoy, Medical Director, Metropolitan Hospital, Detroit; Dr. Bulton W. Rawson, Attending Physician and Chairman, Department of Medicine, Memorial Hospital, New York City, and Dr. Harald H. Rossi, Professor of Radiology, College of Physicians and Surgeons, Columbia University, New York City.