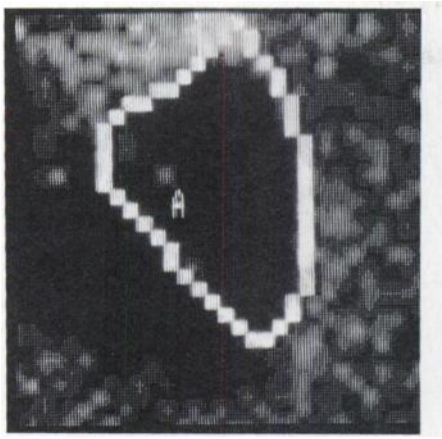

FIG. 4. Paradox image obtained in same projection postoperatively, showing no trace of myxoma.

noninvasive investigation for their diagnosis (*2*). Gated heart-pool scanning is now being requested more frequently as a noninvasive screening test for the patient with atypical cardiac symptoms, and it is likely that atrial myxomas may be demonstrated first in the nuclear medicine departments. Pohost et al. (*3*) have previously described the sensitivity and patterns of movement of left-atrial myxomas as seen on gated heart-pool scans.

A positive area in the paradox image indicates a region where the end-systolic blood volume exceeds that at end-diastole. This is usually a dyskinetic area in the left ventricle but could also represent a space-occupying lesion that is present in the left ventricular cavity only during diastole.

We suggest that the elusive prolapsing left-atrial myxoma be considered if a discrete area is seen on the paradox image near the base of the left ventricle.

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Pulmonary Bleeding Diagnosed as an Incidental Finding during a Gated Cardiac Scan

The purpose of this report is to describe a case in which a diagnosis of pulmonary bleeding was made in the course of a gated cardiac blood-pool scan. In vivo labeling using Tc-99m PPi has provided a simple, noninvasive, and high-efficiency means of red cell labeling and has proved to be an effective means of blood-pool visualization (*1,2*). It has permitted demonstration of bleeding into such sites as the limb and gastrointestinal tract (*3,4*). In this patient it revealed intrapulmonary bleeding.

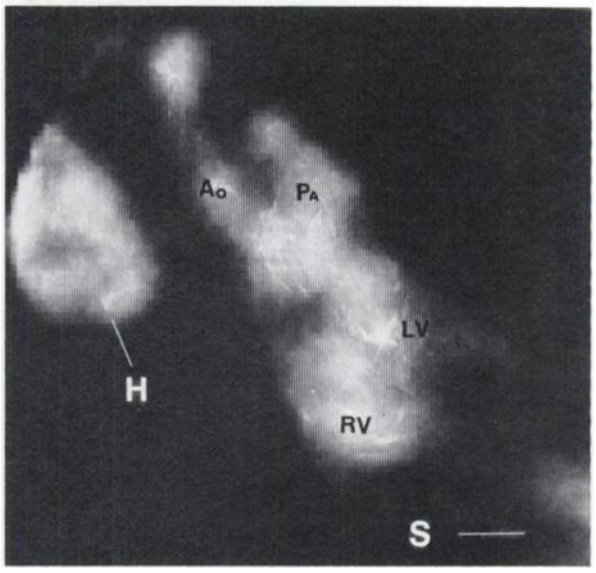

FIG. 1. Summed anterior gated blood-pool image showing right ventricle (RV), left ventricle (LV), pulmonary artery (Pa), aorta (Ao), spleen (S), and hemorrhage (H) within right lung field.

The patient, a middle-aged male, was admitted following a motor vehicle accident. On examination he was confused, hypotensive, and tachypnoeic. He had a flail chest and subcutaneous emphysema was apparent. Radiographs revealed several fractured ribs and hemopneumothorax. Intercostal tubes were inserted. Continued hypotension and abdominal distension prompted a laparotomy. A lacerated left lobe of the liver and a retroperitoneal hematoma were found. The patient continued to deteriorate and developed signs suggestive of cardiac tamponade. To exclude this possibility, first-pass and gated studies were performed in the intensive care unit using a mobile gamma camera on line to a computer located two hundred meters distant.

The study was performed after the patient had received 0.7 mg of stannous chloride intravenously followed 30 min later by 22mCi (800 MBq) of [^{99m}Tc] pertechnetate as a bolus. The first-pass study was performed at five frames per second. Gated cardiac blood-pool images were obtained in the anterior projection and in the LAO projection with 15° of caudal tilt.

The first-pass study indicated displacement of the right pulmonary artery. During the gated study an area of increasing activity was found within the right lung field (Fig. 1) confirmed by a time-activity curve plotted over this region of interest, indicating the presence of intrathoracic bleeding. An emergency thoracotomy was performed and revealed active bleeding from the right middle lobe and adjacent upper lobe. The bleeding segments were resected and additional intercostal drains inserted. Postoperatively the patient's condition improved and he made an uneventful recovery.

Occult hemorrhage is a major and often fatal complication of motor vehicle accidents. Superficial bleeding and administration of intravenous fluids in the emergency situation often masks the diagnosis. Furthermore, the extent of body trauma makes the detection of the bleeding site difficult. Several methods for the location of bleeding have been evaluated (*5-9*). These can be performed with minimal patient discomfort in the acute situation, often at the bedside. Technetium sulfur colloid is rapidly cleared from circulation by the liver and spleen and appears to be helpful in evaluation of intra-abdominal bleeding located away from the liver and splenic uptake. In vivo technetium labeling of red blood cells has provided an effective means of screening patients for

occult bleeding (*3,4*). The ability to observe a slowly increasing uptake over a particular site should prove helpful in the evaluation of intrapulmonary bleeding. Unlike Tc-99m SC, red cells are not rapidly removed from the circulation. This provides a longer time for examination and the potential for repeated studies to permit the discovery of intermittent or subsequent hemorrhage.

This case demonstrates that scanning following in vivo labeling can provide an effective diagnostic test in the management of the patient with acute bleeding. In our particular situation it was fortunate that the bleeding site was in the field of view during the gated study. In cases of major trauma where the possibility of concealed bleeding is considered, scanning of the patient using labeled red cells should provide an effective means of confirming or excluding such a possibility. Further, serial measurements would permit an estimate of bleeding rates.

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