jnm/ CASE REPORT

RADIONUCLIDE ANGIOCARDIOGRAPHIC CONFIRMATION OF TRICUSPID INSUFFICIENCY

Fred S. Mishkin and Michael A. Prosin

Charles R. Drew Postgraduate Medical School and Martin Luther King, Jr. General Hospital, Los Angeles, California

In a patient with clinically certain tricuspid regurgitation, the radionuclide angiogram clearly demonstrated reflux of blood into the inferior vena cava from the right atrium.

Widespread availability of the Anger camera and the short-lived radionuclide ^{99m}Tc has made radionuclide angiocardiography a clinically useful procedure (*1*). Noninvasive and applicable serially, it provides the same information available by roentgenographic contrast angiography but with less resolution. The high injection pressure necessary for the roentgenographic procedure produces flow artifacts. Right atrial injection commonly leads to spurious reflux of contrast media into the inferior vena cava and right ventricular injection may regurgitate into the right atrium due to faulty catheter position or induced arrhythmia. An intravenously injected radionuclide bolus is simply borne by the blood and not subject to the artifacts of pressure injection. Hence, following intravenous injection in the arm, appearance of radioactivity in the inferior vena cava during transit of the bolus through the right heart substantiates the presence of tricuspid insufficiency as illustrated in the following case.

CASE REPORT

An 82-year-old woman entered the hospital because of generalized, crampy abdominal pain, nausea, and occasional vomiting of 2-day duration. For several years the patient had been treated for heart disease with a digitalis preparation and diuretic agents. She said she had hypertension in the past which was untreated. Although dyspnea was denied, she had slept on one pillow for several years and became fatigued after walking a block. She had also noted edema of her lower extremities.

The pulse was 80 and irregularly irregular. Temperature was 37.6°C, respiration rate 20, and blood pressure 150/80. There were rales in the right posterior lung base. The jugular vein was distended approximately 9 cm above right atrial level with the patient reclining at 45 deg and showed occasional accentuation of the V-wave. The peripheral veins were distended and pulsated. A right ventricular heave was palpated to the left of the sternal border and the apical impulse was felt in the 6th interspace at the anterior axillary line. A holosystolic grade III/VI murmur was heard best at the mitral area radiating to the left axilla. A holosystolic murmur with inspiratory accentuation heard over the sternal area radiated to the right axilla. There was fixed splitting of S_2 with pulmonic and aortic components equal in intensity. The inferior border of the liver extended to the iliac crest and pulsated. There was gross pitting edema of the lower extremities.

Atrial fibrillation, left axis deviation, and depressed ST segments in leads V_4–V_6 were present on the electrocardiogram. Chest roentgenography showed gross cardiomegaly and pulmonary venous engorgement. Echocardiography showed dilatation and thickening of the left ventricle and a normal mitral valve. The left atrium and aortic root were also dilated. The aortic leaflets separated normally with the onset of ventricular ejection but came closer together during systole, probably related to mitral regurgitation with reduction of systolic ejection. The configuration of the pulmonic valve appeared similar to the aortic valve. A radionuclide angiogram was performed with the patient supine as part of a liver imaging procedure. Figure 1 is a frame from the study performed following the intravenous injection of 9 mCi of ^{99m}Tc-sulfur colloid in a 1-ml volume.

DISCUSSION

Early appearance in the inferior vena cava of an intravenously injected radionuclide bolus provides a convenient means of confirming the presence of tri-

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For reprints contact: Frederick S. Mishkin, Div. of Nuclear Medicine, Dept. of Radiology, Charles R. Drew Postgraduate Medical School and Martin Luther King, Jr. General Hospital, 12021 South Wilmington Ave., Los Angeles, Calif. 90059.

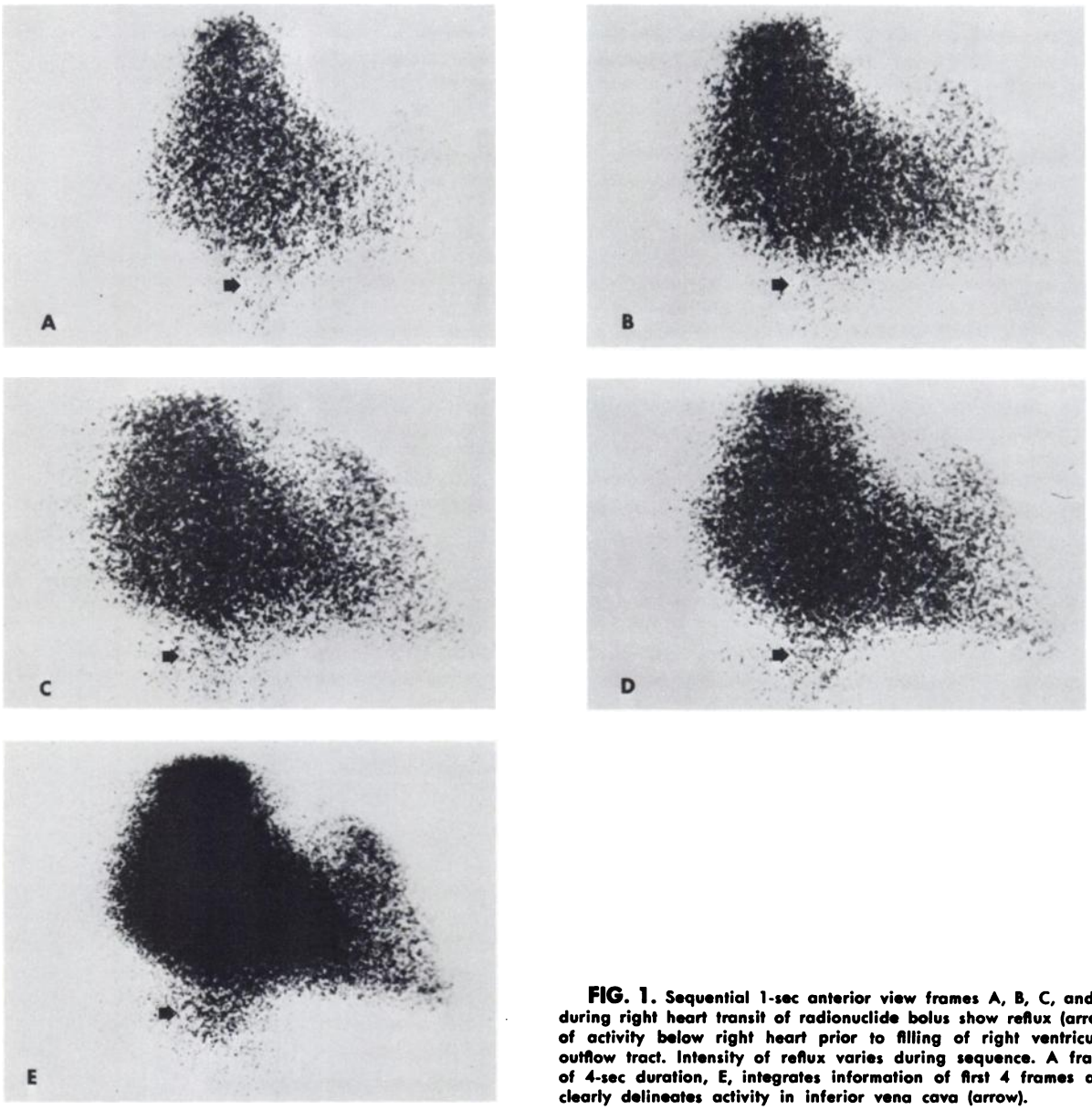

FIG. 1. Sequential 1-sec anterior view frames A, B, C, and D during right heart transit of radionuclide bolus show reflux (arrow) of activity below right heart prior to filling of right ventricular outflow tract. Intensity of reflux varies during sequence. A frame of 4-sec duration, E, integrates information of first 4 frames and clearly delineates activity in inferior vena cava (arrow).

cuspid insufficiency. This finding is not specific since it may be found with high-grade resistance to flow across the tricuspid valve such as occurs with tricuspid stenosis. Sinus of Valsalva rupture into the right atrium or noncardiac conditions such as superior vena caval obstruction may also produce filling of the inferior vena cava. In the latter case, monitoring the course of the bolus during its transit should suggest the appropriate cause. The sensitivity of this method remains to be determined.

ADDENDUM

Since this report was submitted, we have encountered a second patient demonstrating reflux of activity into the inferior vena cava during right heart transit of the radionuclide bolus. The patient had undergone mitral valve commissurotomy previously and had mitral insufficiency. During the time of the study he had congestive heart failure following a documented myocardial infarction. The liver pulsated a few days prior to the study but not on the day of the study when reflux was demonstrated. This observation suggests that the sign of reflux may be more sensitive than the accepted sign of hepatic pulsation.

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REFERENCE

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