Technologist Section, SNM
Seventh Annual Midwinter Meeting
Scientific Paper Abstracts

Louisville, KY — Galt House
Thursday, Feb. 7, 1980 — 3:30-5:00 p.m.
Queens Room — *Janice Brewster*, Moderator

A TECHNIQUE FOR SIMULTANEOUS VENTILATION-PERFUSION LUNG IMAGING UTILIZING Kr-81m GAS AND Tc-99m MACROAGGREGATED ALBUMIN. D. A. Christensen, and T.R. Miller. Mallinckrodt Institute of Radiology, St. Louis, MO.

Kr-81m is a relatively new gas being used in our laboratory for lung ventilation studies. It has several characteristics which make it ideal for this test: 1) a short half-life of 13 seconds; 2) a gamma-ray energy of 190 keV which makes it possible to obtain ventilation scintiphotos after injection of Tc-99m MAA; and 3) a more ideal imaging energy than the 80 keV photon of Xe-133.

In our laboratory we routinely obtain both ventilation and perfusion images in six projections. These include anterior, posterior, both left and right laterals, and left and right posterior obliques. Images are obtained with a Searle Large Field of View Camera with a medium energy collimator rated to 300 keV, and a Micro Dot Imager.

The Kr-81m generator is supplied to us on a daily basis from the Washington University Cyclotron. Equipment easily obtained from a respiratory supply house is used to get simple, efficient delivery of the gas to the patient.

Because of the portability of the Kr-81m generator, a wider range of patients can receive the benefits of this exam, including patients in the CCU, respiratory ICU, patients with tracheotomies, or those on respirators.

PATIENT CONSIDERATIONS IN NUCLEAR CARDIOLOGY. Terry Garner, John Been, Ricky Fahrenkrug, John Carpenter, C.K. Hellman, D.H. Schmidt. University of Wisconsin Mount Sinai Medical Center, Milwaukee, WI.

Nuclear Cardiology Imaging (NCI) has dramatically increased the number of Nuclear Medicine (NM) procedures. Cardiac patients have presented the NM Department with additional responsibilities concerning patient care. For those studies which require transportation of the patient to the department additional support and equipment are, at times, necessary. Coordination of personnel minimizes the amount of patient transport time. Upon arrival a review of the patient history will determine the patient status as well as the indications for NCI. Application of ECG leads and IV insertion may be required. Actual testing demands a well established protocol and that staff be oriented in emergency procedures, equipment operation and maintainance. Physician accessability must be outlined in terms of test indications and emergency situations. Processing of patient data may be extensive depending on the nature of NCI. Both accuracy and quick availability of results are important, especially considering the urgent nature of many cardiac procedures. Therefore, the variable condition inherent to cardiac patients lends to added considerations regarding patient care by the NM technologist.

APPLICATION OF THE BILATERAL COLLIMATOR IN CARDIAC IMAGING. Ricky Fahrenkrug, Terry Garner, John Been, John Carpenter, C.K. Hellman, D.H. Schmidt. University of Wisconsin-Mount Sinai Medical Center, Milwaukee, WI.

The bilateral collimator is a variable resolution and sensitivity collimator that allows multiple view imaging of both static and dynamic studies. The angled collimator septa oppositely direct the radiation at a 30 degree angle to the detector, creating two views 60 degrees apart. Since the detector field of view is decreased by 50% the collimator is not applicable to all patients. Clinical application has demonstrated the collimator's usefulness in Tl-201 myocardial perfusion imaging. By anterior patient positioning 30 degree RAO and 30 degree LAO images of the cardiac region are obtained simultaneously. A 40-50% savings in imaging time has been observed, reducing patient discomfort and time involved in repositioning. This dual image acquisition also reduces artifacts created by myocardial thallium redistribution. The collimator has also proven useful in dynamic studies and in reducing patient radiation exposure. By careful positioning, two views of the left ventricle are obtained under identical physiologic conditions in a fixed anatomical relationship and in perfect time sequence with each other. Dual determination of cardiac ejection fraction and regional ventricular wall motion can be accomplished. Using this technique, multiple walls of the myocardium are visualized with little geometric distortion, during one intervention study.

NON CORONARY ARTERY DISEASE ABNORMALITIES IN NUCLEAR CARDIOLOGY IMAGING. John Carpenter, Terry Garner, Ricky Fahrenkrug, John Been, M.G. Hellman, D.H. Schmidt. University of Wisconsin-Mount Sinai Medical Center, Milwaukee, WI.

The purpose of this presentation is to demonstrate non coronary artery disease (CAD) abnormalities in adults by example and to explain technical difficulties. Both static and dynamic nuclear cardiology (NC) procedures have been ultilized to screen for and assess the degree of CAD. However, there exists a subgroup of abnormal studies which does not orginate from CAD. Nuclear angiography (NA) may be useful in demonstrating shunts, myopathies and valvular disorders. Shunts are commonly presented as an atrial septal defect (ASD) or as a ventricular septal defect (VSD). An ASD or VSD can have its major direction of flow from right to left or left to right. NA can view in cine mode the responses of the aortic, mitral, and tricuspid valves. At present, there are few state of the art methods to quantitate shunts or valvular abnormalities. Unless found during screening, the value of NA in these two cases could be debated since other modalities are available. Myopathies are presented as poorly functioning ventricles without angiographic evidence of CAD. Static imaging can show incidental findings. Examples include bone damage appearing in pyrophosphate images and false positive thallium images due to attenuating materials.

TECHNICAL ASPECTS OF INTERVENTION TESTING IN NUCLEAR CARDIOLOGY. John Been, John Carpenter, Terry Garner, Ricky Fahrenkrug, D. H. Schmidt. University of Wisconsin-Mount Sinai Medical Center, Milwaukee, WI.

Coinciding with the advancement in nuclear cardiology (NC) imaging is the increasing role of intervention NC testing. Nuclear angiography (NA), pyrophosphate (PYP), and thallium (TL) are examples of imaging procedures. NA demonstrates cardiac performance quantitatively and qualitatively. Rest and exercise NA is especially useful for screening cardiac patients and correlating with other clinical findings

such as catherization and echocardiography. Technical standards must be established and maintained in NA concerning patient positioning, collimation, count rate, exercise protocol, and data accumulation parameters of the detector system. Besides pre and post cardiac surgery evaluation and rest and exercise NA, drug intervention studies are frequently performed. Some examples are nitroglycerine, minipress, and adriamycin studies, each of which has unique technical requirements. PYP imaging is useful in determining the presence and location of acute myocardial infarction. The presence of peri-operative infarction is accurately identified by PYP imaging both before and after cardiac surgery. Important parameters include the kit, its preparation, and the time between injection and imaging. The utilization of rest and stress TL imaging differentiates healthy from ischemic and scarred myocardial tissue. Important aspects include physician coverage, testing protocol, IV set-up, emergency equipment and procedures, time from stress to imaging, and time of delayed images.

RUNNING A NUCLEAR CARDIOLOGY DEPARTMENT. John Carpenter, Terry Garner, Ricky Fahrenkrug, John Been, C.K. Hellman, Matthias Fuchs, D.H. Schmidt. University of Wisconsin-Mount Sinai Medical Center, Milwaukee, WI.

The Cardiovascular Disease Section has operated a Nuclear Cardiology (NC) department separate from Nuclear Medicine (NM) for over five years. Due to the successful program and resulting increase in procedures, an outline of operation is presented. The Department is directed by the Section and hence has a large referral base for NC imaging. At least part of the observed success is attributed to quality control and technique validation. Each processed dynamic consists of numbers and images. The internal agreement of the checks and balances in the test allow for careful analysis by the physician. The accuracy of NC imaging has been validated previously by this laboratory versus findings at coronary angiography. Empirical clinical success, cardiologist control, expanded range of available procedures, and experience with two dimensional echocardiography have also contributed. Radiopharmaceutical ordering is done in conjunction with the NM laboratory. An important consideration in NC is the referral base. Types of patients may be surgical, rehabilitation, and screening, with each demanding a specific procedural work-up. As compared to general NM, the increasing role of computerized data analysis in NC demands additional imaging and ancillary equipment. Other groups such as monitoring nurses, biomedical engineers and data processors, extend the range of the NC department responsibility.