

Works-in-Progress

34th Annual Meeting / Technologist Section June 2-5, 1987 • Toronto, Canada

BONE/JOINT

Posterboard No. 982

RAPID HIGH RESOLUTION PLANAR SPINE IMAGE ENHANCEMENT USING A TECHNIQUE INSPIRED BY SPECT USAGE.

P.J. Blevins, R.H. Ballinger, and G.F. Lofties. HCA Midway Park Medical Center, Lancaster, TX.

One often encountered problem while imaging the spine is the ubiquitous hot spot(s) which cause image degradation to the surrounding area. One solution to this has been the use of multiple intensity images. This exhibit suggests a means by which a Compton window and a subtraction technique may mitigate this problem and enhance the image quality.

The major portion of Tc-99m photon interaction with tissue results from Compton scattering. Jaszczak et al. have shown improved image quality and increased resolution in imaging based on the subtraction of Compton events. A second imaging window can be introduced about the 92-125 KeV range for these events. Images are then acquired as in a dual energy situation, with the true Tc-99m and scatter images stored separately. Subtracting the scatter image from the true Tc-99m photo-peak image often alone improves the image. More troublesome ones may require normalization of the Tc-99m and scatter images prior to subtraction, with the resultant image then subtracted from the unaltered Tc-99m image.

Our scans to date have shown enhanced resolution and, a softening of the hot areas with improved boundary definitions.

Posterboard No. 983

TECHNICAL CONSIDERATIONS OF DPA OF THE PROXIMAL TIBIA IN PATIENTS STATUS POST TOTAL KNEE ARTHROPLASTY.

K.D. Hill, J.S. Karp, and M.G. Velchik. The Hospital of the University of Pennsylvania, Philadelphia, PA.

DPA is a well established technique to determine BMD in the lumbar spine and femoral neck. We have adapted this technique to investigate BMD changes in the proximal tibia in patients post TKA. However, certain technical modifications are necessary to achieve reliable results.

To precisely calculate BMD, the orientation of the long axis and the rotational axis of the tibia must be standardized. Placing the tibia in the same transverse plane as that of the scanning table and securing the foot perpendicular to that plane ensures reproducible positioning.

Lack of adequate soft tissue surrounding the knee prevents the establishment of a baseline attenuation. A 2 cm thickness of lucite placed under the knee and extending past the scan line limits on either side of the knee allows us to properly calculate baseline. The attenuation coefficient of lucite approximates that of soft tissue.

Examples of the pitfalls and technical modifications will be illustrated in the exhibit.

Posterboard No. 984

ASSESSMENT OF BONE MINERAL DENSITY (BMD) IN PATIENTS WITH BEHAVIORAL EATING DISORDERS.

W.R. Kasecamp, N.D. LaFrance, F. Hubbard, J. Rhine, A. Anderson, and V. Dave. The Johns Hopkins Medical Institutions, Baltimore, MD.

Behavioral eating disorders (anorexia nervosa and bulimia) affect up to 20% of the young adult population. Because of these altered eating disorders, we examined the bone mineral density (BMD) values in a group of 25 patients with known eating disorders (21 anorexia nervosa and 5 bulimia patients) and compared these results to 10 normal volunteers without history of any eating disorders. Dual photon absorptiometry (DPA) measurements of the lumbar spine (L2 to L4 region) along with a risk factor questionnaire were obtained on all patients. Even though a number of patients had extreme degrees of weight loss with behavioral and/or psychiatric dysfunction, successful studies could be done on all the subjects. The normal control population weighed more than the group of eating disorder patients, 120.1 ± 4.6 vs. 96.5 ± 3.1 pounds ($p < 0.001$). This normal control group was also older, 36.8 ± 2.1 vs. 27.6 ± 2.3 years ($p < 0.05$). The BMD values for the control group was 1.21 ± 0.03 vs. 0.99 ± 0.03 g/cm ($p < 0.001$) for the eating disorder population. An osteoporosis risk questionnaire was completed for all the subjects and widely varied for all groups. We conclude: 1) eating disorder patients can be successfully studied by DPA; 2) eating disorder patients have significantly decreased BMD values; 3) risk rating questionnaires may not always predict decreased BMD; 4) BMD studies help in the management of eating disorder patients since they demonstrate the detrimental effects of eating disorders and allow identification of patients requiring treatment to correct decreased BMD.

CARDIOVASCULAR

Posterboard No. 985

TECHNICAL CONSIDERATIONS IN THE COMPARISON OF GATED RADIONUCLIDE ANGIOGRAPHY AND TRANSESOPHAGEAL ECHOCARDIOGRAPHY IN THE NON-INVASIVE ASSESSMENT OF LEFT VENTRICULAR VOLUMES.

C. Cobb, J. Urbanowicz, E. Botvinick, N. Schiller, University of California, San Francisco, CA.

Gated radionuclide angiography was applied as a "gold standard" for comparison with transesophageal echocardiographic (TEE) estimates of left ventricular (LV) volumes and ejection fraction (EF) critical to patient management in the early postoperative period following cardiopulmonary bypass. Patients are studied hourly during the initial 5 post-operative hours. Scintigraphic values are compared to TEE values obtained from a single cross-

sectional short axis LV view.

The implications of a number of specialized technical problems related to the character of the surgical intervention, the acute dynamic clinical state of the patient and the prolonged nature of the protocol need to be addressed in order to accurately quantitate scintigraphic analysis. These major technical problems relate to the integrity and distribution of the label during the study and its effect on EF and volume calculations. Specifically in this setting pericardial and intrathoracic bleeding can obscure ventricles, making estimations of EF difficult and adding to the counts used in the calculation of volumes. Additional technical considerations include precise timing of acquisitions, ICU nursing staff orientation and cooperation, and those related to TEE.

In the 6 patients studied to date, the correlation between scintigraphic and TEE determined EF has been weak ($r = .69$). A thorough explanation of the specialized methods and their technical considerations as well as an evaluation of these factors on the correlation between TEE derived and scintigraphic measurements will be presented.

Posterboard No. 986

A STUDY OF THE EFFECTS OF PATIENT EDUCATION ON COMPLIANCE, KNOWLEDGE, AND ANXIETY IN RELATIONSHIP TO UNDERGOING A 201-THALLIUM STRESS EXAMINATION.

D. Reimers, Department of Nuclear Medicine, SUNY Buffalo, NY and Veterans Administration Medical Center, Buffalo, NY.

201-Thallium myocardial imaging following exercise induced stress is an accepted procedure for detecting coronary artery disease and assessing myocardial viability. In order for the study to be properly interpreted, maximum patient cooperation is required. Lack of cooperation can result in repeated testing, unnecessary additional exposure, loss of valuable camera time, and additional expense to the Nuclear Medicine Department. It has been observed that patients are not well informed about the 201-Thallium stress examination procedure. The objective of this study is to determine whether formal education of the patient will have an effect on compliance, knowledge, and anxiety prior to undergoing a 201-Thallium stress exam.

Approximately 60 patients will be randomly divided into control and experimental groups. The control group will receive a questionnaire to measure anxiety and a 201-Thallium instruction sheet. The experimental group will receive a questionnaire to measure anxiety, a questionnaire to measure knowledge concerning the 201-Thallium study, and a 201-Thallium instruction sheet which describes the procedure in detail.

Prior to the start of the 201-Thallium stress exam, all patients will complete an anxiety questionnaire and a questionnaire to measure knowledge concerning the 201-Thallium stress exam. The technologist(s) performing the study will also complete a compliance checklist. Prior to the start of the second set of

images, all patients will complete an anxiety questionnaire. The data collected will be analyzed using parametric statistical methods.

The following scientific paper abstract was accepted after the March *JNMT*, which included the Technologist Section Program, went to press.

SCIENTIFIC PAPERS III: TRACK B, Clinical Imaging I

1:30-3:00

Room 202B

*Moderator: Vincent V. Cherico, CNMT
Comoderator: Lynnette A. Fulk, CNMT*

No. 1029.1

SPECT IMAGING OF THE THYROID: TECHNICAL AND CLINICAL CONSIDERATIONS.

R. Rippin, J.J.S. Chen, D.W. Koller, P.D. Cole. The Johns Hopkins Medical Institutions, Baltimore, MD.

This study was undertaken to determine the application of SPECT imaging in the evaluation of thyroid disease. Thirty patients with a variety of thyroid diseases were studied using both pinhole and SPECT imaging. Twenty-three patients were imaged 4 to 6 hours after receiving 400 μ Ci I-123 orally. Five patients receiving Tc-99m pertechnetate and two patients receiving Tl-201 were imaged 10 to 30 minutes post injection.

The SPECT images were acquired using the Toshiba GCA-90B gamma camera and a parallel slant hole collimator. Thirty images were obtained over a 180 degree rotation. Each image was acquired for 45 seconds in a 64×64 matrix. Total imaging time was 22 minutes. The projection data was corrected for camera non-uniformities and smoothed prior to reconstruction using a 9 point spatial operator. Transaxial, sagittal and coronal slices were reconstructed without attenuation correction.

After comparing planar versus SPECT images of the thyroid, we conclude that SPECT: 1) is better than planar imaging in delineating warm nodules from normal thyroid tissue; 2) offers no advantage over planar imaging in the evaluation of cold nodules; 3) involves relatively short acquisition and processing times; 4) is useful in evaluating the degree of tracheal compression in patients with multinodular goiter; and 5) can be used to measure functional thyroid volume.