Guest Comment

Impact of Computed Cranial Tomography on Radionuclide Brain Imaging and Cisternography

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Computed cranial tomography (CCT) first became available in 1973 as a new simple procedure for evaluating the brain and ventricular system *(1–3)*. Radionuclide imaging was the most widely used technique for the noninvasive evaluation of the brain prior to the introduction of CCT. The first CCT was installed at this institution in early 1974 and we noted the loss of the usual annual increase (15%) in radionuclide brain images. The second CCT was installed in late 1974 and we noted an even greater decrease in the number of radionuclide brain images and cisternograms performed. We, therefore, proceeded to evaluate the effect of CCT on the number of radionuclide procedures at this institution. Although our experience may not be directly applicable to other nuclear medicine divisions, we feel that this information will be beneficial to those institutions planning their future requirements, including personnel, space, and equipment.

We evaluated the number of radionuclide imaging procedures performed in each calendar quarter from Jan. 1973 to Dec. 1975. The radionuclide procedures evaluated included brain, cisternogram, liver-spleen, bone, thyroid, lung, kidneys, and myocardial infarct images.

Eight-hundred-twenty-five brain scans and 46 cisternograms were performed in the three-month period preceding the arrival of the first CCT (Fig. 1). For a similar time period one year after both CCT units were operational, the number of brain scans decreased to 545 and the number of cisternograms to 14, representing a decrease of 34% and 70%, respectively. A 22% decrease was noted in the total number of brain scans and cisternograms performed in 1973 compared to 1975 (Fig. 2). The decrease in the number of brain scans and cisternograms was greater in 1974–1975 than in 1973–1974. However, radionuclide imaging procedures other than brain scans and cisternograms increased during the same two-year period (Fig. 3).

Some early reports *(1–3)* predicted that CCT would have a considerable impact on other neuroradiological procedures including radionuclide brain imaging and cisternography. This impact was noted at our institution and some others *(4, 5)*, but it has not occurred at

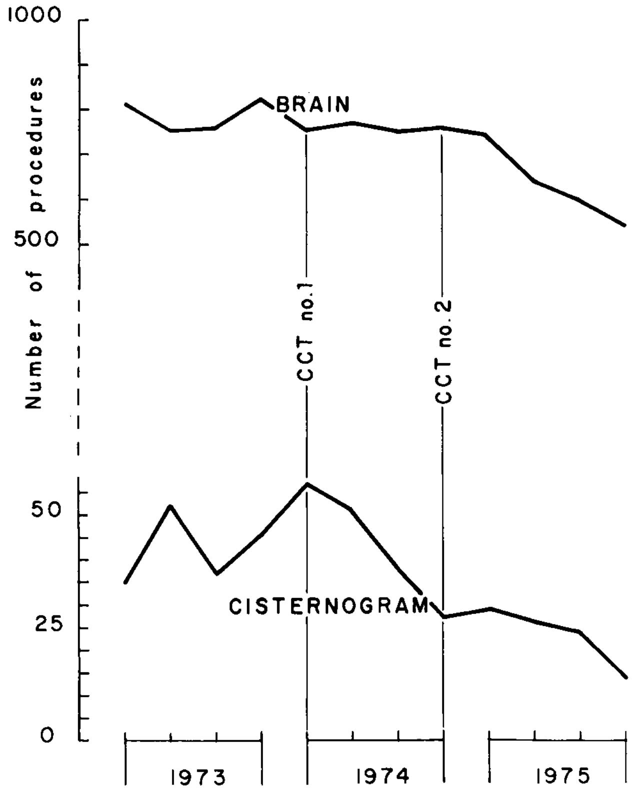

FIG. 1. Number of radionuclide brain scans and cisternograms performed by calendar quarter for 1973–1975.

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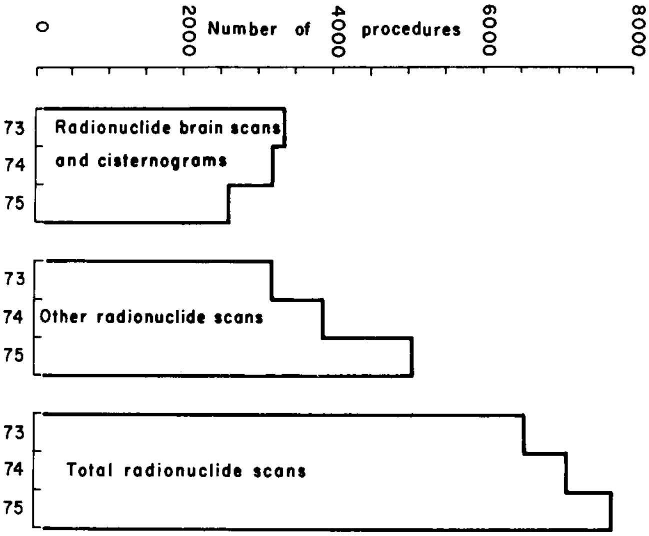

FIG. 2. Number of radionuclide brain scans, cisternograms, and other procedures performed during 1973–1975.

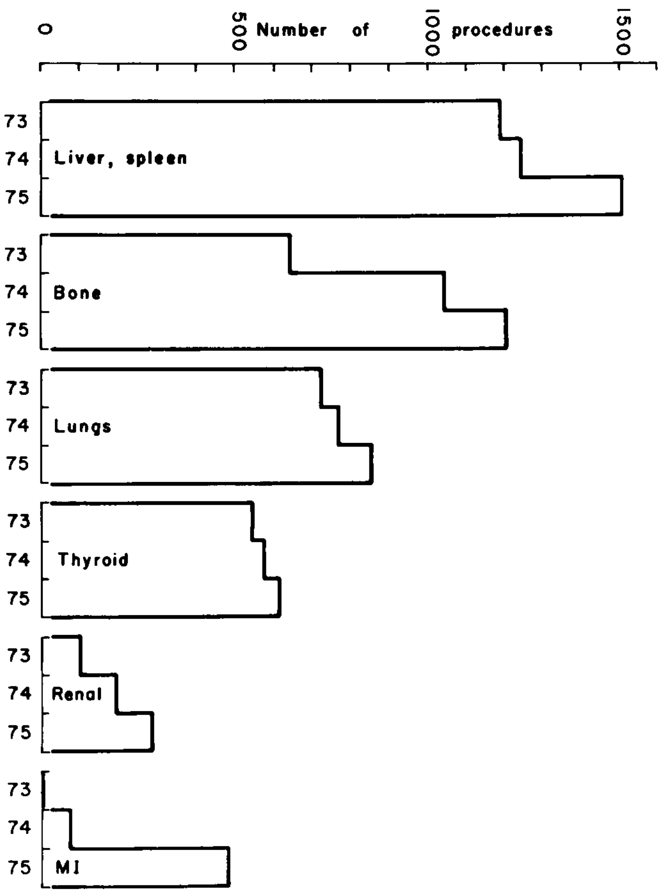

FIG. 3. Increase in number of radionuclide imaging procedures other than brain scans and cisternograms for 1973–1975.

all institutions *(6)*. Baker *(4)* reported a decrease in radionuclide brain scans performed at Mayo Clinic when CCT became more generally available, with shortened patient waiting periods between scheduling the performance of the study. A similar decrease in radionuclide brain scans was noted at Massachusetts General Hospital when the CCT unit there went to a 16-h/day operation. We noted the loss of the expected yearly increase in radionuclide scans after the first CCT unit was installed here at Mallinckrodt. The absence of an early decrease in radionuclide brain scans at this institution may have been related to several factors, including a long patient waiting period for CCT, no data available on utilization of CCT and radionuclide imaging, and studies comparing CCT and radionuclide imaging being performed. When the second CCT was installed, the patient waiting period was decreased from approximately three weeks to three days for outpatients and from five days to one day for inpatients. Furthermore, at approximately the same time that the second CCT was installed, our studies comparing CCT and radionuclide imaging were completed *(7–10)*, and other comparative studies became available *(11–13)*. Since that time, a decrease in radionuclide brain images has been noted.

In studies comparing radionuclide brain imaging and CCT, lesion detection by these two modalities has been similar *(7, 11–13)*, with slightly better detection of intracranial mass lesions by CCT than radionuclide imaging. A study of the optimal utilization of radionuclide brain imaging and CCT resulted in several recommendations to avoid unnecessary studies *(10)*: (A) CCT with contrast enhancement should be the first procedure performed in patients who have focal neurologic disease or generalized seizures of recent onset and no history of sensitivity to contrast media; (B) patients without focal neurologic abnormalities and who are not demented can be evaluated adequately by radionuclide brain imaging; (C) patients with cerebrovascular accidents benefit from both CCT and radionuclide imaging; (D) more information can be obtained with CCT than radionuclide brain imaging in patients with dementia; (E) in patients with dementia, cisternographic findings and CCT patterns give similar diagnoses *(7, 9)*; and (F) the cisternogram remains the procedure of choice for determining cerebrospinal fluid dynamics.

In summary, the number of radionuclide brain images and cisternograms have decreased at this institution whereas the total number of radionuclide imaging studies has continued to increase. Radionuclide brain imaging and cisternography still have important roles in patient evaluation, but the applications have become more limited since the introduction of CCT.

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