426

MEASUREMENT OF GFR OR ERPF BY THE BLOOD CLEARANCE METHOD -- APPLICATION OF A NON-LINEAR LEAST SQUARES METHOD --.

K.Takahashi *,A.Komatani *,T.Hoshi *,
K.Yamaguchi * and S.Sugano **
Department of Radiology *, Urology **
Yamagata Univ. School of Medicine,Yamagata

A method has been developed to estimate glomerular filtration rate (GFR) or effective renal plasma flow (ERPF) using computer evalration images obtained during routine radionuclide imaging. Many previously described procedures require numerous blood samles to determine plasma clearance.
Gates's method is questionable in accuracy for individnal variations in the volume of distribution of the radionuclides used. Our technique requires less then 40 minutes of imaging time and requires only a single blood sampling. The time-activity curve on the heart ROI was used instead of numerous blood samplings. The curve was analysed with a two compartment model fusing a non-linear least squared method, thereby estimating volume distribution. Absolute value of GFR and ERPF was caluculated based on the radioactivity of the sampled blood. The correlation factor was 0.92 between GFR with Tc-99m DTPA and Ccr(60min) and 0.90 between ERPF with I-123 OIH and C_{PAH}. It was also possible to obtain accurate GFR or ERPF by our method in the case of urinary retention or ureterosigmoidostomy.

427

ESTIMATION OF THE CREATININ CLEARANCE FROM Tc-99m-DTPA CARDIAC CLEARANCE.

F.Tanaka,H.Fujii, T.Fukushima,T.Matsubara,H.Washida,H.Sakagami, Y.Iwase and S.Sasaki.Anjo Kosei Hospital,Anjo.

About 6000 patients who had undergone a renoscintigraphy in the year 1979 to 1986.We had presented a estimation method of Ccr from Tc-99m-DTPAcr at the 24th J.N.M..Later,However,diuresis renopraphy are doing now by required administration of frusemaid 10 mg(15 min. post Tc-99m-DTPA injection).Suspected Ccr value is made a misstake in some cases.

In this time,We applies the 2compartment mode on the pharmacokinetics to a cardiac clearnce curve within 15 minutes,which is smoothed two times,by 3 points smoothing method.T(1/2) value is calucu-lated,standard blood volume is suspected from Weight.Our method is supposed that there are the volumes of the extravascular and vascular fluids. DTPAcr is estimated by those data.

Case 78 (17 females,61 males,average age 57year)
DTPAcr:average 117.5ml/min. st error 32.2ml/min.
Ccr :average 64.2ml/min. st error 11.4ml/min.
y=0.248 x DTPAcr + 35.047
r=0.727 p<0.01

428

A TRIAL OF AUTOMATIC RENAL ROI DETERMINATION.

M.Yamashita, T.Miyazaki, T.Yagyu and H.Nakahashi. Kyoto prefectural Univ. of Medicine and Nishijin Hospital.

Automatic renal ROI determination is considered to be the largest obstacle in fuilly automatic renogram analysis from image data obtained in a dynamic renal study with Tc-99m-DTPA. As it is essential to exclude the liver, spleen and/or heart pool activities, we combined a simple isocount technique and an edge detection procedure using Laplacian operators.

In some cases with poor or no renal function automatic renal determination was not possible. In these cases, however, manual ROI determinations were also difficult. We found it practical to apply our method in routine clinical examinations and obtained sufficient results.

429

EVALUATION OF QUANTITATIVE SPLIT RENAL FUNCTION BEFORE AND AFTER TREATMENT IN THE PATIENTS WITH RENOVASCULAR HYPERTENSION OR URINARY OBSTRUCTION.

T.Aburano, T.Takayama, K.Nakajima, M.Seto, T.Michigishi, N.Tonami, K.Hisada, M.Yamada, Y.Iida, M.Kawamura and M.Matsudaira. Kanazawa University School of Medicine, Kanazawa.

The three different methods to evaluate the alteration of split renal function before and after surgical or medical treatment in patients with renovascular hypertension or urinary obstruction. The parenchymal transit time was measured by deconvolutional analysis of left ventricle and renal parenchym time-activity curves taken from a computer-linked gamma camera after i.v. administration of Tc-99m DTPA. And split GFR and ERPF after I.V. administration of Tc-99m DTPA and I-131 OIH were measured respectively by the methods using kidney counting corrected for depth and dose. In the patients with renovascular hypertension following PTA treatment, the improvement of ERPF at the affected side was more pronounced compared to that of GFR. In the patients following continued Captopril treatment, the decrease in GFR at the affected side was more pronounced. And in the patients after relief of urinary obstruction, the improvement of transit time was observed although both GFR and ERPF was decreased due to the parenchymal effect of percutaneous nephroureterolithotomy. These findings suggest that the combined studies may be necessary in ealuating the alteration of renal function following surgical or medical treatment.