N. Kidney and Urinary Tracts

Analysis of Changes due to Pharmaco-loading Multi-Frame Renal Image

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Epinephrine (0.1–20mcg) and Dopamine (5mcg/kg/min) were added on the procedure to regional renograms using ^{99m}Tc-DTPA 5mCi i.v. injection from on line data with scinticamera and computer, appearing some changes on their curves:

A) For Epinephrine added normal control 10 cases,

1) renal cortical renograms had almost no influences by the drug,
2) reaction times on renograms were slightly more prolonged at renal pelvis than medulla,
3) urodynamic changes were marked at postrenal segments,
4) renogram curves change to down slope promptly after loading the drug, then to up slope as recovery.

B) For Dopamine added normal controls, renogram curves change to more prolonged down slope and affected portions were as well as A).

C) For Epinephrine added postrenal lesions, renogram curves change more remarkably.

D) For Dopamine added parenchymal renal diseases, renogram curves change to normalized pattern.

It is emphasized that pharmaco-loading effects have a further diagnostic and therapeutic value through their characteristic changing patterns on each renal lesion.

The ^{131}I-Hippuran Dynamic Renal Study with Deconvolution Analysis

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Analysis of the renogram by deconvolution, using an on-line computer, shows promise as a means of expressing renal function in terms of tubular transit time for ^{131}I-Hippuran. We have already shown that the deconvoluted renogram (transfer function) is a simulation of the curve of renal activity which is obtained after the dose of ^{131}I-Hippuran are injected as a single bolus into the renal artery.

In this study, the transfer functions for the whole and the regional kidney are clinically evaluated in normal and cases with some renal diseases. The transfer function for the whole kidney shows the percentage and the delay of the population of the abnormal transit times. Therefore, it is of value in judging the degree of the lesions.

On the other hand, the regional transfer function is seemed to reveal the nature of the lesion itself. For example, in glomerulonephritis, renovascular hypertention and nephrosclerosis the transfer functions have a tendency to be composed of two different populations of normal and delayed transit time, but those in pylonephritis and hydronephrosis appear to consist of almost single population of considerably prolonged transit times. We have also made functional images by using several parameters for analysing the regional transfer functions. This technique is of special value to know the nature and intrarenal distribution of the lesions.

At the same time, for comparative information, effective renal plasma flow (ERPF) is obtained by using time-activity curve for cardiac region selected by the light pen. Estimated value for ERPF is di-

vided between right and left kidney according to the initial height of the transfer function of each kidney, which is assumed to be proportional to the blood flow.

Functional Image of the Kidney Using on-Line Minicomputer System in Obstructive Uropathies

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Functional image of the kidney, the parametric map of the regional renal function were developed using ^{131}I-hippuran sequential scintigram data. An Anger camera and on-line minicomputer system were employed for the data processing.

A dynamic curve in each element of the digitalized image was extracted and the pertinent parameters (T-max, C-max, UP SLOPE, DOWN SLOPE, and COMPARTMENT) were calculated to display as parametric map on a CRT.

In this study, 47 cases of obstructive uropathy including renal stone p-u junction stenosis etc, were studied using these functional imaging and were compared with the findings of renogram, renal scintigram, intravenous pyelography and laboratory data.

Classifications of obstructive uropathy were divided into 4 groups of hydronephrosis by I.V.P. (Oka, Otnes), 11 cases of dilated pelvis, 8 cases of atrophy of papillae, 16 cases of large global calyces, 8 cases of huge hydronephrosis.

In generally, in the case of hydronephrosis, significant delay of T-max and increase of number of COMPARTMENT were demonstrated at the hydronephrotic portion, especially, image of DOWN SLOPE in the hydronephrotic portion were expressd as defect, which the remaining cortex with normal excretroy function is clearly discriminated from the impaired portion.

According to the degree of hydronephrosis (1–4), each parametric map showed the characteristic image which reflect clinical significance in obstructive uropathy, and the size and the degree of hydronephrotic change are estimated in the functional images. Moreover, the functional images of the hydronephrosis were proved to be useful for the evaluation of regional distribution of the renal function and were applied to the indication of operation of hydronephrotic patients.

Follow up by Using ^{99m}Tc-DTPA after Operation of Urinary Diversion with the Ilial Conduit and the Ureterosigmoidostomy

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We tried to analyse of dinamics of urine stream in ileum and colon after operation of urinary diversion by using ^{99m}Tc-DTPA and γ-camera with computer system.

Collimeter is high-analysable with 2 million hole for low energy. 5–7 mCi of ^{99m}Tc-DTPA was injected intravenously, patient was lay supinely, and image of intestine was obtained clearly by polaroid camera timely from about 5 or 6 minute after injection in normal case of renal function. Simultaneously collecting curve and them avoiding curve of radioactivity in the intestine by direct counting was recorded continuously. It's able to compare with normal collecting curve of radio-