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CLINICAL EVALUATION OF RENAL FACTOR ANALYSIS WITH Tc-99m DTPA IN VUR AND HYDRONEPHROSIS.
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Functional renal imaging through factor analysis with Tc-99m DTPA was evaluated in VUR and hydronephrosis. Dynamic renal imagings and renograms were carried in 10 cases. Furosemide was injected intravenously in 10 min. after the administration of tracer. Acquisition was performed with a ZLC-7500 scinticamera coupled to a Scinti-pac 2400 minicomputer. 50 images of 20 sec. each were recorded and stored in the form of 64×64 point matrices. Factor images were divided into three components, namely vascular, parenchymal and pelvic components. 11 Kidneys with Type A and B by O'Reilly's classification had both parenchymal and pelvic TAC* with response to diuretic injection(Type I). Two of 3 kidneys with Type C had both parenchymal and pelvic TAC without response(Type IIa), but one kidney got parenchymal TAC with response(Type IIb).

* Time Activity Curve

Conclusion

We conclude that functional renal imaging through factor analysis from diuretic renogram is useful for evaluating renal function of VUR and hydronephrosis.

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RADIONUCLIDE ASSESSMENT OF RENAL FUNCTION ON OBSTRUCTIVE RENAL DISEASES.
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Radionuclide assessment of renal function was performed in 26 patients with renal-ureteral stone and in 7 patients with vesico-ureteral reflux using Tc-99m-DTPA and Tc-99m-DMSA. Glomerular filtration rate (GFR) of each kidney was determined by Gates' method with determination of DMSA uptake rate.

Grade of hydronephrosis, assessed by thickness of renal parenchyma, correlated with GFR and DMSA uptake rate.

VUR grades were classified on the bases of voiding cystography. VUR grades correlated highly with GFR and DMSA uptake rate.

Factor analysis was applied to Tc-99m-DTPA study. It was possible to separate factor of renal parenchyma from renal pelvis. The peak time of renal parenchyma, calculated by factor analysis, correlated with thickness of renal parenchyma.

We have concluded that radionuclide study of the kidneys is very useful in obstructive renal diseases.

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Simple GFR Estimation Using Tc-99m DTPA Kidney/Background Ratio without Syringe Counting.
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Among various radionuclide GFR measurements, Gates' method with Tc-99m DTPA has been most widely used. However, its correlation coefficient with creatinine clearance (Ccr) is much worse than the prevous reports (r= 0.711, N=50). Moreover, pre- and postinjection syringe counting is cumbersome in busy circumstances. So we have examined whether more simple Kidney/Background ratio (K/B ratio) 2-3 min post IV could be used as an index of GFR. ROI's were created as Gates' method, and K/B ratio of each kidney were calculated.

The correlation coefficient between K/B ratio and Ccr was 0.693 (N=50), and was not sttistically different the one between Gates' GFR and Ccr. The correlation coefficient between split K/B ratio and Gates' split GFR was 0.672 (N=90). Renal depth and body surface correction did not improve the correlation, and simple pixel correction of the BK was sufficient.

In conclusion, although K/B ratio is not as accurate as Ccr, it may be as accurate as Gates' method. This method may be simple and fast index for the estimation of GFR.

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MEASUREMENT OF GROMERULAR FILTRATION RATE (GFR) BY Tc-99m-DTPA RENOGRAM.
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A simplified method, acoording to the method of Gates, to determine GFR from the renal uptake of Tc-99m-DTPA was studied. The counting efficiency of a scintillation camera was previously measured. The injected dose was determined by a digital curiemeter and was converted into count rate. The depth and width of the kidney was obtained from body height and weight and the width of the abdomen using the conversion formula made by us. The region of interest of back ground was set up around the kidney. The improved method of back ground subtraction and count correction of the depth of the kidney, using the coefficient calculated from the depth and width of the kidney and the width of the abdomen, was applied. A hand calculation of the renal uptake was so troublesome that a calculation program was written into the data processor (Scintipac 2400) to obtain easily the value of uptake.

The correlation between renal uptake and 24 hour creatinine clearance (Ccr) was studied in 59 cases whose renogram and Ccr were examined at the almost same time. The result was that the renal uptake within 3 to 4 minutes had good correlation (r=0.876) with Ccr. This method to easily determine GFR was avilable for a routine examination.