Scintigraphic Evaluation of Renal Function in Renal Transplant Donors

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Dear Sir,

Renal transplantation is the most preferable treatment in chronic renal failure. Although there are some advantages in using living donors as kidney source, long-term effects of depriving the donors of one kidney are still being investigated [1]. In this study, in 38 living donors (14 males, 24 females, mean age 36, with a range of 19–53 years) we tried to compare different parameters of renal function in the pre- and posttransplantation period, and to evaluate renal functions both clinically and scintigraphically.

^{99m}Tc-labelled DTPA (diethylenetriamine pentaacetic acid; 10 mg, i.v.) was used for static and dynamic renal scintillation images which were taken by Toshiba 501 γ -camera for 40 min.

During the 1st minute a time-activity curve was drawn to determine the perfusion of the remaining kidney. Then static images were taken up to the 35th minute to illustrate renal size and localization. Another time-activity curve (renogram curve) encompassing 1–40 min was drawn. The upslope of this curve shows the concentration, and the downslope curve shows the excretion phases [2]. With the aid of many parameters in dynamic scintigraphy the perfusion, concentration and excretion of the kidneys can be worked out in detail. Images from dynamic renal scintigrams of the kidneys in the postoperative period demonstrated no divergence from normal kinetic, concentration and excretory phase parameters (table 1). In the pre- and posttransplantation era, physical examinations and routine laboratory values of donors including glomerular filtration rate were all within normal limits. Hypertension developed in 2 and proteinuria (mean 0.45 g/day) was detected in 10 female donors. We compared multiple

scintigraphic parameters of 9 proteinuric donors with nonproteinuric ones. The results did not disclose any change in these scintigraphic parameters in proteinuric donors.

Table 1. Mean values of basic scintigraphic parameters in renal transplantation donors

Basic

scintigraphic parameter values

Kinetic phase

Mean transit time, s 8.99 ± 0.65

Time needed to reach maximum concentration, s 6.45 ± 0.59

Phase of concentration

GFR for remaining kidney, clearance of DTPA,

ml/min 52.23 ± 3.33 Time needed to reach maximum concentration, min 4.61 ± 0.55

Upslope/Tmax-1 0.003 ± 0.0002

Phase of excretion

Time needed to excrete half of the radionuclide, min 14.32 ± 0.86

Crossing point of upslope and time needed

to excrete 5% of the radionuclide, min 8.75 ± 0.88

Downslope 0.049 ± 0.01

There were 26 donors (14 f, 12 m) aged 36 ± 2 years (range 20–53 years). The number of scintigraphies was 38, the mean follow-up period 23 months (range 1–120 months).

When we compared our results with the literature, the incidence of hypertension was observed to be similar [3]. We failed to demonstrate renal hypertrophy both scinti-graphically and radiologically possibly because of the relatively short follow-up period. All scintigraphic parameters were within normal limits and compatible with the results of other classical laboratory findings. As in the literature, proteinuria did not correlate with other renal functions [4]. Apart from Donadio's study in 1967, which consisted of the use of radioisotopes in calculating glomerular filtration rate, no study in the literature has been designed to establish the place of radionuclide imaging techniques in the follow-up of donor kidney functions.

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As a result we concluded that dynamic renal scintigraphy is a sensitive and reliable method that can be recommended in the follow-up of kidney donors. More donors and a longer follow-up period are required to attain more accurate representation of renal functions.

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