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## UTILITY OF NEPHROSONOGRAM PRIOR TO ISOTOPE RENOGRAPHY

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### ABSTRACT

The purpose of the present paper was to determine if nephrosonogram is useful prior to radionuclide renogram.

**METHODS :** 752 renograms (464 males, 288 females, age range 18 months to 77 years) were done, amongst these prior ultrasound scans were performed in 612 patients. Additional imaging tests e.g. IVU, renal angiogram etc. were done in 88 cases only.

**RESULTS :** Significant increases in the accuracy of renogram were observed with prior ultrasound scan. We performed nephrosonography almost routinely prior to radionuclide renogram by probe renograph or gamma camera using I-131 hippuran orthoiodohippurate (OIH) or Tc 99m diethylene triamine pentaacetate (DTPA). The 1<sup>st</sup> or arterial phase may be missed in probe renograph if the renal hilum is not marked by ultrasound. Recently gamma cameras are available in our country and probe renograph is almost obsolete. Therefore nephrosonogram may not be so essential to study individual renal function. However, in some gamma cameras, one or more photomultiplier tube (PMT) may be out of order and useful field size may be limited. In these situations prior nephrosonogram may be helpful in optimization of quality of gamma camera renogram also. All the Nuclear Medicine Centres in Bangladesh are equipped with Ultrasonographs and no extra charge is made for nephrosonogram prior to radionuclide renogram.

**CONCLUSIONS :** We recommend USG prior to renogram. Renal hilum is easily marked by ultrasound scan and during nephrosonography (USG), some other important findings e.g. renal size, shape, position, number, calculus, cyst, neoplasm etc. also can be visualized. Intravenous Urography (IVU) and digital subtraction angiography (DSA) are rarely needed\*.

**Key words :** Isotope/radionuclide renogram, nephrosonogram, USG.

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### INTRODUCTION

Ultrasonography (USG) has a reported sensitivity of up to 98% for detecting renal obstruction.<sup>1</sup> However, the diagnostic yield of renal USG for excluding hydronephrosis in patients in

intensive care units without predisposing factors for obstructive uropathy is very low.<sup>2</sup> Since 1981, we are performing nephrosonography almost routinely prior to radionuclide renogram (RR) by probe renograph or gamma camera renogram using I<sup>131</sup> hippuran/ orthoiodohippurate (OIH) or Tc 99m diethylene triamine pentaacetate (DTPA). The 1<sup>st</sup> or arterial phase may be missed in probe renograph if the renal hilum is not marked by ultrasound. Recently gamma cameras are available in our country and probe renograph is almost obsolete. Therefore nephrosonogram may not be so essential to study individual renal function. However, in some gamma cameras, one or more photomultiplier tube (PMT) may be out of order and useful field size may be limited. Therefore prior nephrosonogram may be helpful in optimization of quality of gamma camera renogram also. All the Nuclear

Medicine Centres in Bangladesh are equipped with Ultrasonographs. Individual kidney function is best assessed by radioisotope renogram (RR)<sup>3</sup> which is divided into three phases : (a) arterial or vascular (b) secretory or glomerular and (c) excretory or clearance. Renal hilum is easily marked by ultrasound scan and during nephrosonography (USG), some other important findings e.g. renal size, shape, position, number, calculus, cyst, neoplasm etc. also can be visualized.<sup>4-6</sup> Intravenous Urography (IVU) and digital subtraction angiography (DSA) are rarely needed. Therefore, we like to perform nephrosonography prior to radionuclide renogram and in this study we compare the two situations, namely (a) sonogram+ renogram (USG + RR) and (b) only renogram (RR) in various diseases. (Fig.1)

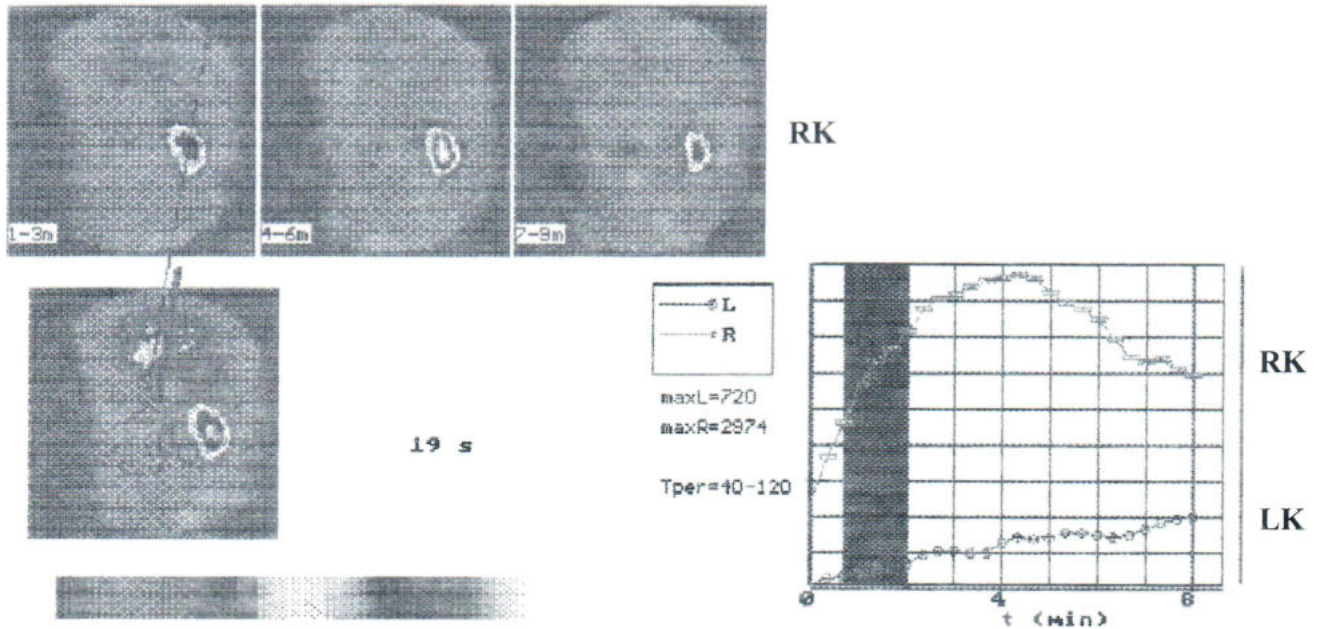


Fig 1 <sup>99m</sup>Tc DTPA Renogram showing normal right kidney and poorly functioning left kidney.

## MATERIALS AND METHODS

During December 1981 to December 2001, we performed 752 renograms (464 males, 288 females, age range 18 months to 77 years) in the Institute of Nuclear Medicine at Dhaka, Nuclear Medicine Centres at Dinajpur and Rangpur, amongst these prior ultrasound scans were done in 612 patients. Additional imaging tests e.g. IVU (Intravenous urogram), renal angiogram etc. were done in 88 cases as per advice of the referring

physician/surgeon which was again influenced by socioeconomic factors and available facilities. (Table-1) We have done 198 diuresis renograms. As the diuretic agent, we have used, frusemide injections in 68 cases and oral water in 130 cases.<sup>7,8</sup> Results of renogram and USG are shown in Table-2. Water diuresis renography is useful for obstructive uropathy.

**Table 1** Number of patients in different places and periods.

Place of study	Period	USG + RR	RR	Addl. Investigations
Inst. of Nuc. Med.	Dec. 81-Dec. 88	375	24	49
NMC, Dinajpur.	Jan. 89-July 94	76	55	12
NMC, Rangpur.	Aug. 94-Dec. 01	161	61	27
		<u>612</u>	<u>140</u>	<u>88</u>

**Table 2** Results of sonogram and renogram

No. of cases	Diagnosis	Sonogram	Renogram
145	Urolithiasis	Echogenic structure casting acoustic shadow	Delayed excretion only in advanced stages
137	Hydronephrosis	Pelvic dilatation	Prolonged secretory & excretory phases
139	Medico-renal diseases e.g. diabetes, hypertension	(a) Swollen/small kidney (b) Renal corticomedullary indistinction (c) Normal echoes	(a) Small arterial phase (b) Prolonged secretory phase
61	Polycystic kidney	Echofree areas	Distorted secretory phase
29	Relative renal ischemia	Small kidney	Small arterial phase (ischemic)
15	Ectopic kidney	Abnormal site e.g. pelvis	(a) Normal renogram (b) Ischemic kidney
28	Renal neoplasm	Irregular echoes	All phases depressed
25	Congenital solitary kidney	Single kidney	Single kidney
<u>33</u>	<u>Normal kidneys</u>	<u>Normal echoes</u>	<u>Normal renograms</u>
612			

## RESULTS

The patients who had both nephrosonogram (USG) and radionuclide renogram (RR) rarely needed additional imaging tests, e.g. IVU and angiogram. A young man of 19 years had normal DTPA renogram, but abnormal in hippuran study, later he needed hemodialysis and renal transplant for chronic renal failure.

## DISCUSSION

The reasons of not doing ultrasound in all cases are (a) sometimes the ultrasound scanner was out of order (Institute of Nuclear Medicine, Nuclear Medicine centre, Rangpur) or not available (Nuclear Medicine Centre, Dinajpur), (b) rarely the workload was so high that we had to avoid sonography.

## CONCLUSION

We Recommend routine nephrosonogram prior to radionuclide renogram to diminish the need of invasive, risky and expensive investigations e.g. IVU and angiogram. Sometimes other congenital anomalies e.g. infantile uterus ect. may also be diagnosed.<sup>9-11</sup>

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