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Original Article

Renal Function Evaluation of Hypertensive Patients by Renogram in a Teaching Hospital

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Abstract:

Arterial Hypertension is the most common cardiovascular disease and is a major public health problem in both developed and developing countries. The aim of the study was to assess renal involvement in hypertensive patient by renogram, which is not detected by conventional biochemical test. This was a cross sectional observational study. Consecutive 30 hypertensive patients admitted in the medicine wards from March, 2006 to April, 2007 in Rajshahi Medical College Hospital, Bangladesh were taken as case. Informed consent was taken from all the study patients or from their attendants. Detail history was taken from each patient or from their attendants' then clinical examination and relevant investigations were done. Emphasis was laid to find out renal involvement in long standing hypertensive patients by renogram. After initial selection; laboratory investigations like Urine for R/M/E, Blood Sugar 2ABF, S. Creatinine, USG of KUB, ECG and Hb% were done for every patients. All patients included in this study renogram were done. Majority of the patient (40%) were between the age of 41-50 years and Male: Female ratio was 3:2. Most of the patient lead a moderately active life (66.67%). Serum Creatinine was raised in 23.33% patient whereas renal parenchymal insufficiency evidenced by renogram was found in 50% case. In this study, we found that a significant number of cases (26.67%) having renal parenchymal insufficiency were not detected by S. Creatinine level, but detected by renogram. Renogram is superior to conventional biochemical renal function test for early detection of hypertensive nephropathy.

Key words: Hypertensive patient, Renal function, Renogram.

Introduction:

Arterial Hypertension is the most common cardiovascular disease and is a major public health problem in both developed and developing countries[1]. It is asymptomatic, readily detectable, usually easily treatable and leads to lethal complication[2]. It produces a marked effect on patients either because of hypertension per se or through its complications (stroke, renal dysfunction and heart failure) which can produce premature death or permanent disability[1]. The most common cause of death is heart disease, or stroke; but renal failure also frequently occurs. So, renal involvement is an important lethal complication of systemic hypertension[2].

Whether hypertension is essential or of known etiology, persistent exposure of the renal circulation to elevated intraluminal pressure leads to arteriosclerotic lesion of the afferent and efferent arterioles and glomerular capillary tuft and results in decreased GFR and tubular dysfunction[2,3]. These renal vascular damage leads to proteinuria, haematuria and progressive renal failure[4]. The extent of damage of the kidneys can be measured by renogram which is an excellent sensitive test to quantify the renal function and it is a new approach to document renal involvement in systemic hypertension[5-7]. Renogram gives surprisingly accurate measurement of GFR and provides an assessment of functional renal mass and also assess renal plasma flow. The indications for Nuclear Renography are to measure renal function and flow, to determine the contribution of each kidney

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to overall renal function, to demonstrate the presence or absence of functional renal mass lesion, to detect obstruction and to evaluate Renovascular disease[8,9]. These Renographic study require the injection of gamma ray emitting radiopharmaceuticals which are taken up and excreted by the kidneys, a process which can be monitored by an external gamma camera. In this way the function of individual kidney can be assessed[10].

Material and Methods:

This cross sectional observational study was carried out in indoor Medical Wards of Rajshahi Medical College Hospital from March, 2006 to April 2007. Adult Hypertensive patient (age 18 year and above, SBP =140 or more, DBP=90 or more) irrespective of primary and secondary hypertension were included as case & excluded those hypertensive patients who were unconscious, presented with subarachnoid hemorrhage, diabetes mellitu sand any acute or critical illness. Hypertensive pregnant women and lactating mothers were also excluded. A total 30 hypertensive patients were included in this study. Data was collected by taking history and thorough clinical examination and all appropriate investigations were done. Data was analyzed by using SPSS (Statistical package for social sciences).

Results:

This study shows maximum studied patients were between the age 41 to 50 year age group(40%), but significant number of cases were found below the age 40 year(33.33%) with a male: female ratio was 3:2 (Table-I).

Table-I: Age and sex distribution of the patients (n=30)

Age range (year)	Number of patient		Total Number (%)
	Male	Female	
< 40	6	4	10 (33.33)
41-50	6	6	12 (40)
51-60	2	1	3 (10)
61-70	2	1	3 (10)
71-80	2	0	2 (10)

Table II shows 43.33% patient had family history of hypertension, 23.33% had family history of hypertension and 33.33% not known hypertension.

Table- II: Relation with the family history of hypertension

Family history of hypertension	Number of patients	Percentage
Present	13	43.33%
Absent	7	23.33%
Not known	10	33.33%

In this study majority of the patients (53.33%) has some target organ damage (Table-III). Majority of the patients have no proteinuria (50%) and only 20% have proteinuria and/ haematuria (Table-IV).

Table-III: Relation with target organ damage

Target Organ Damage	Number of patients (%)
Present	16 (53.33)
Absent	14 (46.67)

Table-IV: Relation with proteinuria and/ or haematuria.

Proteinuria and/or haematuria	Number of patient (%)
No Proteinuria	15 (50)
Trace albuminurea	9 (30)
Proteinuria &/orhaematuria present	6 (20)

In our study most of the patient has normal serum creatinine level (76.67%) and the level was raised in 23.33% case (Table-V).

Table-V: Relation with serum creatinine level (n=30).

Serum Creatinine	Number of patient (%)
Normal	23 (76.67)
Raised	7 (23.33)

This study shows 50% patients have renal parenchymal insufficiency. Among them 30% have bilateral and 20% have unilateral renal parenchymal insufficiency (Table-VI).

Table-VI: Relation with Renographic function (n=30).

Renogram	Number of patient (%)
Normal	15(50)
Abnormal	15(50)
Unilateral renal parenchymal insufficiency	6(20)
Bilateral renal parenchymal insufficiency	9(30)

In this study 8 out of 30 patients have renal parenchymal insufficiency despite normal serum creatinine level (26.67%) (Table-VII).

Table-VII: Relation of S. Creatinine and Renographic findings among abnormal renography.

S. Creatinine and Renographic findings	Number of patient (%)
Normal S. Creatinine but abnormal renogram	8 (26.7)
Raised S. Creatinine and abnormal renogram	7 (23.33)

Discussion:

A total of thirty hypertensive patients irrespective of primary or secondary hypertension were studied in period of March 2006 to April 2007.

In our study majority of the patients were between the age of 41 year and 50 year (40%). No case was found above the age of 80 year. But a significant number of cases were found below the age 40 (36.67%). Hypertension is more prevalent above the age 60 year. It affects more than half of all people over the age of 60 (including Isolated systolic hypertension)[11]. But in our study only 20% patient are above 60 year. This result may be due to small number of study people.

Hypertension is more prevalent in male and female ratio is 0.7: 0.6 at the age of 30 and 1.2:1.1 at the age of 60[11]. In this study, 60% patients were male and 40% were female. So, Male: Female ratio is 3:2. This study correlates with the male predominance in case of hypertension. Total 43.33% patient had family history of hypertension in our study and rest of the patient had either no family history of HTN (23.33%) or not known (33.33%). As 95% HTN is essential and essential HTN tends to run in families[12] so, this result correlate with fact.

More than 50% hypertensive patients develop some sort of target organ damage[13]. In our study we found clearly that majority of the patients had target organ damage (TOD) i.e. 53.33%. We found that 20% patient had proteinuria and/or haematuria, 30% patient had trace albumin urea and rest of the 50% patient had no proteinuria or haematuria. Proteinuria or haematuria is the evidence of renal involvement in hypertensive patient.

In our study, biochemical renal function test i.e. S. Creatinine level was raised in 23.33% but Renographic findings shows renal parenchymal insufficiency in 50% cases, among them 20% is unilateral and 30% is bilateral renal parenchymal insufficiency. Renographic findings show renal parenchymal insufficiency in spite of normal S. creatinine level in 26.67% cases. Similar Study on this topic is not available, so it is not possible to compare this study to others.

We know that an increase of S. creatinine level outside the normal range is typically not seen until GFR is reduced by 50% and isolated measurement of S. creatinine may give misleading impression of renal function[14]. So, to raise S. creatinine level kidney function to be lost more than 50%. In this respect S. creatinine is not a reliable marker for detection of early involvement of kidney as a complication of hypertension. Whereas the extent of damage of the kidneys can be measured by renogram which is an excellent sensitive test to quantify the renal function[5] and it is a new approach to document renal involvement in systemic hypertension[6]. Renogram gives surprisingly accurate measurement of GFR and provide an assessment of functional renal mass and also assess renal plasma flow[9]. Besides this, Renogram can detect renovascular hypertension, especially renal artery stenosis which is an important cause of secondary as well as uncontrolled hypertension. So, Renogram is superior to conventional biochemical renal function test for detection hypertensive nephropathy.

There are a number of other renal function tests which are not included in this study; among them UTP, CCR and IVU are significant to mention here. UTP-CCR test is a bit troublesome test, because it requires collecting urine for 24 hours and it is Urinary volume dependent and less accurate to measure GFR. Regarding IVU, it requires such contrast media which can produce anaphylactic reaction, more over, patient's are exposed to x-ray for long period. Again this test is becoming unpopular in medical practice day by day and with the advent of ultrasound, its role is now much diminished. Currently the main indications are the investigation of persistent haematuria, renal and ureteric calculi, ureteric fistulas and stricture and complex urinary tract infection (including tuberculosis)[15]. With this respect Renogram is a safe and accurate renal function test.

This is a small study and it may not reflect exact situation of the fact in the community. So, it needs large scale study to make evident to detect early renal involvement in hypertensive patient.

Conclusion:

This observational study was carried out to observe renal complication of hypertensive patient not detected by conventional biochemical test but can be detected by Renogram. In this study, we found that a significant number of cases (26.67%) having Renal parenchymal insufficiency were not detected by S. Creatinine level, but detected by renogram. So, Renogram is superior to conventional biochemical renal function test for early detection of hypertensive nephropathy.

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