RENAL FUNCTIONS IN PREGNANCY HYPERTENSION†

by

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Introduction

Hypertensive disorders of pregnancy is a condition which may be noticed during any period of pregnancy, though it is often aggravated in the last few months, when it may be accompanied by albuminuria and oedema. One may come across a number of patients with hypertension in pregnancy with variable clinical symptoms. The renal factors may be the cause of hypertension and lead to complications and/or death. In fact, it was postulated by many workers that some sort of kidney lesions (either the cause or the effect) are intimately related with this disorder with or without superimposed toxaemia.

Review:

As early as in 1839 Rare pointed out the occurrance of Nephritic albuminuria (Bright's disease) in pregnant Women.

Lever (1843) also observed that urine of eclamptic women is albuminous and he considered renal damage to be the result of compression of renal veins by enlarged gravid uterus. On the other hand McIllory (1936) postulated that toxaemia is associated with presence of B. Coli infection of urinary tract.

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Goldblatt in 1934 suggested Renal ischaemia as a cause of hypertension which may be precipitated or aggravated by pregnancy; but this theory was opposed by Ballient (1961) who, by introducing clearance technique, had measured renal blood flow and maintained that diminished blood flow is the effect of hypertension but not the cause and this may not be detectable by the usual biochemical methods.

There are controversies regarding the extent of mechanism of renal involvement and functional alteration but one fact is certain and agreed by almost all the workers that there exist some impairment of Renal Blood flow, concentration power and excretion (Corcoran and Page, 1941; Pickering, 1955; Deloon and Preifus, 1960; Smith, 1961).

But it was not always possible to correlate the extent of renal function impairment with the duration of hypertension and age of the patient (Dalton et al, 1942).

The blood urea estimation is an important index of renal function and it is usually raised in hypertensive patients. Pillmann (1929) suggested that blood urea value is usually lowered in pregnancy but Ball and Evans (1932) and Dodds (1932) from two different series observed that upto 40 mg% of urea in pregnancy may be considered as normal.

Thus the blood urea value as an index of renal function cannot be accepted in pregnancy and it has got its own limitation to reflect a correct picture of renal status.

Visualisation of renal tract by intravenous pyelogram was carried out by many (Winter 1961, 1964, Kennedy et al 1965). Recently Bedford and Taylor (1972) performed I.V.P. in 100 cases of toxaemia in pregnancy in a follow-up study. They reported an incidence of 38 per cent abnormal urogram.

Winter and Taplin (1958) introduced isotopic renogram to rule out unilateral kidney disease

in hypertensive persons and to detect gross abnormality in renal functions that involve large portion of kidney parenchyma (De Maria *et al*, 1960). Later on, West and Nordyke (1963) used the same process in obstetrical and gynaecological patients for detection of renal disease and assessing renal function in hypertension.

In 1964, H. Graf et al utilised isotopic renogram to estimate glomerular filtration rate and tubular secretion and absorption rate in 35 patients with toxaemia in pregnancy, 15 days to 11 months after delivery. In their study, they found 12 patients with bilateral renal abnormality whilst in 10 cases there was evidences of unilateral disease.

Aims & Objects

(1) To correlate the clinical, and biochemical findings with that of more sophisticated measures like I.V.P. and Renogram.

(2) Evaluation of routine renal function tests which are carried out in clinical practice.

(3) To obtain a true picture of renal damage in our group of patients with hypertension in pregnancy.

Material and Methods

This study was carried out in Eden hospital, Medical College, Calcutta, during the period from May '74 to October '75. Altogether 46 patients were studied including 5 cases of normotensive pregnant women for control.

All the patients were studied in their third trimester of pregnancy, with a blood pressure of 140/90 mm of Hg or above, with or without proteinuria and/or oedema along with 7 cases of eclampsia. While the age group varied between 17 to 35 years, the parity ranged between 0-5. The patients were grouped as follows:

Group A—Hypertension manifests only during pregnancy, disappearing between pregnancies (H.I.P.) — 8
Group B—Hypertension antedating pregnancy (H.A.P.) — 11
Group C—Pre-eclampsia (P.E.T.) — 15
Group D—Eclampsia (E.T.) — 7
Group E—Normal term pregnancy without hypertension (Control) — 5

All the patients were examined as follows:

Blood pressure was recorded at least on two occasions at the interval of one hour and a consistent blood pressure of 140/90 mm of Hg or above, was the first criteria to select the patient.

A thorough systemic examination including detailed cardio-vascular examination was undertaken (only those patients with normal E.C.G. were taken).

Urine examination for albumin, sugar, microscopical examination, specific gravity and urinary culture (Leigh & William, 1964) was done.

Total urinary output was also noted, and all the patients were subjected to water concentration test.

Estimation of blood urea was carried out after I.V.P.—Performed by I.V. Injection of Sodium Iodo thalmate (Conray 420).

Isotopic renogram—By using scintillation detectors. The substance used was I-131 labelled Hippuran.

The last two studies were deliberately avoided during pregnancy and undertaken in the immediate puerperium (1st week).

Observations

Urinary Analysis

In all the patients the specific gravity ranged between 1015 to 1025.

Water concentration test also revealed no abnormalities.

Each of the 22 cases of toxaemia group (including eclampsia) had albuminuria of varied degree and only 3 cases of hypertension without toxaemia out of 19 had albuminuria (traces of albumin).

Significant bacteriuria as evidenced by colony count—(1 lac/ml.) were found in 5 cases out of 41 cases of study group. All these patients were asymptomatic.

Blood urea was within normal range varying between 20 to 35 mg% in all the patients with or without toxaemia.

In the control group of women no abnormality was found regarding above.

In the following tables further observations are presented.

TABLE Ia
Analysis of Urogram—46 Cases

	Control (5) Normal	Study (41) Normal
Normal I.V.P.	5	25
Abnormal	0	16

All the normotensive patients and about 60 per cent cases of hypertensive patients showed normal I.V.P.

In 40 per cent cases of study group the following abnormalities were revealed.

Out of 46 isotopic renographic studies performed, 4 of 5 cases of control group and 8 out of 41 cases of study group did not show any abnormality.

The following abnormalities were found in about 74 per cent cases of pregnancy hypertension including 1 case from the normotensive pregnancy.

The above Table reflects how the hypertension alters the I.V.P. and renogram pictures adversely with change of grade. While 50-60% abnormal I.V.P. was found in grade III and IV hypertension, the isotopic renograph revealed 100% abnormalities. On the other hand, with grade I hypertension the abnormality incidences were lowest, both in I.V.P. as well as in Renogram.

TABLE Ib
Results of Urogram Showing Different Types of Abnormality

Nature of abnormalities	No.	Percentage
Congenital lesion	3	7.5
(1) Duplex kidney	1	2.5
(2) Benign cyst of kidney	1	2.5
(3) Aberrent renal artery	1	2.5
Acquired lesion		
(1) Disparity in the size of kidney (size difference more than 1 cm.)	2	5
(2) Both kidneys small (less than 9 cm.)	3	7.5
(3) Pyelonephritic change	3	7.5
(4) Ureteric calculi	1	2.5
(5) Poorly functioning kidney (Unilateral and Bilateral)	4	10.0
Total Abnormal urogram	16	40

TABLE II

Results of Renogram Showing Different Types of Abnormalities

	Nature of abnormalities	No.	Percentage
(i)	Impaired function of one kidney	22	47.74
	(a) Impaired function of right kidney	11	23.87
	(b) Impaired function of left kidney	11	23.87
(ii)	Impaired function of both kidneys	4	8.68
(iii)	Obstructive uropathy of one kidney with normal function of other	6	13.02
(iv)	Obstructive uropathy of one kidney with impaired function of other	2	4.34
	Total abnormal renograms	34	73.8

TABLE III

Renal Abnormalities as Found by I.V.P./Renogram With Different Grades of B.P.

Range of B.P. (Systolic)	No. of cases	Grading of B.P.	I.V.P. abnormal	Renogram abnormal
140 mm of Hg.	7	Grade—I	1 (14.3%)	3 (42.8%)
140-159 mm of Hg.	14	„ II	5 (28.8%)	11 (78.5%)
160-179 mm of Hg.	9	„ III	4 (44.4%)	8 (88.2%)
180-199 mm of Hg.	5	„ IV	3 (60%)	5 (100%)
200 or more mm of Hg.	6	„ V	3 (50%)	6 (100%)
Normotensive	5		—	1

TABLE IV

I.V.P. and Renogram in Different Groups of Patients

	No. of cases	L. V. P. abnormal	Reno-gram abnormal
Control	5	nil	20%
H.I.P.	8	25%	63%
H.A.P.	11	18%	91%
P.E.T.	15	18%	74%
E.T.	7	15%	86%

The above Table clearly shows the accuracy of renogram studies over I.V.P.

Out of 46 cases studies (control and study group) I.V.P. revealed only 16 abnormalities, whereas renogram could reveal 34 cases of dispaired renal function of varied degree.

Comments

It is a well established fact that hypertension of long duration adversely affects the renal functions. How for renal functional impairment occurs in hypertension of short duration associated with pregnancy is a matter of wide controversy. There is plenty of scope to work in this field as this affects particularly the younger population (15 to 40 yrs.) of our society.

With a view to find out the extent of renal damage in pregnancy hypertension with or without toxaemia, this retrospective study was undertaken.

One may question about the role of these sofisticated studies in our present day set up, though the author is completely aware of the fact that this cannot

be introduced in the routine practice. At the same time, the fact cannot be ignored that in many of the patients, clinical and routine biochemical assessments of renal function are not enough and do not reflect the true renal status.

At least intravenous pyelography should be performed routinely in all cases of pregnancy hypertension with or without toxaemia and whenever possible isotopic renographic studies should also be undertaken in the puerperium.

It has not been possible to perform follow-up renograms in all the cases; however in 10 cases follow-up renographs were performed after 3 months of the first study. In almost all the cases the previous changes persisted with slight of previous changes persisted with slight or no improvement.

In the present series it was found that up to 3 months there was no reversion of kidney functions in the small number of cases that was followed up. A further follow up study, upto at least 2 years and in next pregnancy might reveal the true renal functional status.

One should not be complacent that toxaemias of pregnancy is a completely reversible process. The extent of renal functional impairment that was found by the present workers in pregnancy hypertensions and even in 1 case of normal pregnancy without any urinary symptom alarms us and one must follow up all the cases, for evidences of any persistence of renal dysfunction.

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