OPHTHALMODYNAMOMETRY & ITS CLINICAL SIGNIFICANCE IN TOXAEMIA OF PREGNANCY*

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Introduction

Bailliart's (1917) ophthalmodynamometer is of great help in recording the central arterial pressure which is of clinical significance in toxaemia of pregnancy. Suganuma (1936), observed higher central retinal arterial pressure in toxaemia of pregnancy. Kologolu (1955), assessed its prognostic value in eclampsia and found that rise in the diastolic pressure of central retinal artery was much earlier than the brachial diastolic pressure. Leonardi (1956), observed rise in the first stage of normal pregnancy. Avello and Avello (1956), described the diagnostic importance of raised central retinal arterial pressure in toxaemia of pregnancy. There are great variations in findings of various workers; even normal readings are not the same.

Material and Method

In this work Bailliart's opthalmodynamometer was used. This study was taken up to evaluate the ophthalmodynamometric value of central retinal arterial pressure in normal and pre-toxaemic stage of pregnancy in the third trimester. These patients were taken up from the maternity ward and out-patient departments of S. N. Hospital, Agra, and were divided into the following groups:

Group A	Normal pregnancy	11 cases
Group B	(a) Potential toxaemia	4 cases
	(b) Toxaemia of pregnancy	13 cases
	Total	28 cases

These patients were examined in a sitting position. The pupils of both eyes were dilated by homatropine drops 2%, except in suspected cases of glaucoma. The blood pressure was recorded in seated position of both the arms. After anaesthetising the eye with 1% anethaine drops, the intraocular tension was taken with Schiotz tonometer. The foot of an ophthalmodynamometer was applied over the sclera at the insertion of the lateral rectus, and the fundus was examined with an ophthalmoscope. As soon as the artery first began to pulsate rhythmically on applying pressure with the dynamometer, the diastolic reading was recorded from the dial with the help of an assistant. The pressure was then increased quickly until the arterial pulsations ceased and vessels appeared obliterated. This was the systolic reading.

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Received for publication on 15-9-67.

The readings recorded in grams were converted into mm. Hg. with the help of the chart supplied with the instrument.

Observations

Group A—*Normal pregnancy*

The ages of the patients were between 20 and 30 yrs. The fundi were perfectly normal in every case. The mean diastolic and systolic pressures in the central retinal artery and the brachial artery and the ratio between brachial and central retinal pressures in 11 normal antenatal cases are given in Table I, out of which observations were made 1 week after delivery in 4 cases.

Group B—Sub group (a).

Similarly, the results of similar investigations in four cases of potential toxaemia of pregnancy are expressed in Table II. The Table also includes the results in three cases under the same group but re-examined one week after delivery.

Sub group (b)

It included 13 patients of toxaemia of pregnancy which were divided into, (i) pre-eclampsia, and (ii) eclampsia. Out of these 13 patients 10 cases were studied again after the delivery. (5 of pre-eclampsia and 5 of eclampsia). The results are shown in Table III.

TABLE I

Showing retinal and brachial arterial pressure in mm Hg. and B/R Ratio in normal subjects

No. of cases	Diastolic pressure			Systolic pressure		
	Retinal Mean	Brachial Mean	B/R Ratio Mean	Retinal Mean	Brachial Mean	B/R Ratio Mean
Ante-natal 11	33	70	1 : 0.46	65	117	1 : 0.56
Post-natal 4	30	66	1 : 0.44	65	112	1 : 0.57

TABLE II

Showing retinal and brachial arterial pressure in m mHg. and B/R ratio in potentially toxaemic subjects

No. of cases	Diastolic pressure			Systolic pressure		
	Retinal Mean	Brachial Mean	B/R Ratio Mean	Retinal Mean	Brachial Mean	B/R Ratio Mean
Ante-natal 4	50	80	1 : 0.64	70	122	1 : 0.56
Post-natal 3	30	66	1 : 0.45	64	116	1 : 0.54

TABLE III

Toxaemia of pregnancy

Showing the mean values of retinal and brachial arterial pressure in mm Hg. and B/R ratio

No. of cases	Diastolic pressure			Systolic pressure		
	Retinal Mean	Brachial Mean	B/R Ratio Mean	Retinal Mean	Brachial Mean	B/R Ratio Mean
Ante-natal		Pre-eclampsia				
6	53	83	1 : 0.65	82	134	1 : 0.61
		Eclampsia				
7	66	91	1 : 0.70	98	156	1 : 0.61
Post-natal		Pre-eclampsia				
5	31	68	1 : 0.45	65	114	1 : 0.56
		Eclampsia				
5	38	73	1 : 0.51	66	115	1 : 0.57

Discussion

In this study the cases were divided into two main groups 'A' and 'B'.

In group 'A' which included normal patients, a total number of 11 cases were studied in the third trimester and of these, 4 cases were also studied in the post-natal period. The mean B/R ratio in the ante-natal period was 1 : 0.46 for the diastolic and 1 : 0.56 for the systolic to be considered as normal.

Four cases were followed up after the delivery. The retinal blood pressure was not found to be in any way different from non-pregnant healthy subjects. It was also found that there was not much difference in retinal arterial pressure, in the ante-natal and post-natal periods. Our findings do not agree with the findings of Suganuma (1936) that the percentage drop in brachial diastolic pressure following delivery was almost double that of retinal diastolic pressure.

In four normal pregnant women it was found that both diastolic and systolic retinal arterial pressure was increased earlier than the brachial blood pressure and on follow up it was found that one case developed toxaemia of pregnancy. In these patients the fundus was normal. This is an important finding. If retinal arterial pressure rises earlier than the brachial, these patients must be kept under observation for toxaemia of pregnancy.

Increase in retinal arterial pressure associated with abnormal gain in weight may lead to threatened pre-eclampsia. Thus repeated examination of brachial pressure and comparison of retinal and brachial diastolic pressure will provide an early diagnosis of pre-eclampsia and at this stage preventive measures can thus be instituted early.

The ante-natal ophthalmodynamometric examination of healthy pregnant women especially in the third trimester can certainly help in diagnosing pre-eclampsia. In pre-eclampsia and eclampsia it was found that

both diastolic and the systolic central retinal arterial pressure, were definitely raised above normal and B/R Ratio was disturbed. (Table IV). It

TABLE IV

Showing central retinal arterial pressure in normal cases, pre-eclampsia and eclampsia in mm Hg.

S. No.	Groups	Retinal arterial pressure	
		Diastolic	Systolic
1.	Normal	33	65
2.	Pre-eclampsia	53	82
3.	Eclampsia	66	98

was also seen that there was parallel oscillation between brachial and retinal diastolic pressure. If central retinal arterial pressure rises on subsequent examinations, it gives an indication that there is a severe toxaemia of pregnancy and pregnancy may be terminated, otherwise blood vessels are likely to be permanently damaged.

Summary

In all 28 patients were studied, 11 of normal pregnancy, 4 of potential toxaemia and 13 of toxaemia of pregnancy. It was found that central retinal arterial pressure, was raised much earlier than the brachial arterial pressure in the patients who were potentially toxaemic, and definitely raised in pre-eclampsia and eclampsia. This early rise of pressure in the central retinal artery in potentially toxaemic patients, helps in diagnosis, better treatment and prognosis.

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