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To evaluate the fundus changes in patients with hypertensive disorders of pregnancy: Gestational hypertension, preeclampsia, eclampsia

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ABSTRACT:

Aim: To evaluate the fundus changes in patients withGestational hypertension,preeclampsia oreclampsia.

Methods: All the patients who fulfilled the diagnostic criteria of Gestational hypertension, preeclampsia or eclampsia(>20 weeks of pregnancy, high arterial blood pressure of more than or equal to 140/90 , proteinuria more than or equal to 300mg/day or protein creatinine ratio more than or equal 30 mg/mmol or evidence of maternal organ dysfunction or uteroplacental dysfunction , convulsions or coma) were included in this study. After taking history for any eyesymptoms, anterior segment was examined with torch light on the bed itself. Both pupils were dilated with 1% tropicamide eye drops and fundus examination was done by ophthalmologist with direct ophthalmoscope in a semi dark room in the ward. Hypertensive retinopathy changes seen in right or left or both eyes, was taken as positive findings in that patient.

Results: A total of 100 patients were examined. The mean age of patients was 31.2±6.2 years (range 20-50 years). The gestation period ranged between 25 and 41 weeks. 45 (45%) were primigravidas , 33 (33%) were multigravidas and 22(22%) were grandmultiparas. 41(41%) had mild preeclampsia, 56(56%) had severe preeclampsia and 3(3%) had eclampsia. Retinal changes (hypertensive retinopathy) were noted in 58(58%) patients . There was statistically significant positive association between the presence of retinal changes and blood pressure (P =0.001), proteinuria (P=0.021) and severity of hypertensive disorders(P=0.027). However, age(P = 0.44), race (P=0.89) and gravida (P =0.37 were not associated with occurrence of retinopathy in our study.

Conclusion: Fundus examination in gestational hypertension , preeclampsia and eclampsia is important in monitoring and managing cases as it correlates with severity as it indirectly implies severity of changes in placental micro-circulation that can help to predict the foetal outcome and ocular morbidity.

Keywords: Fundus, Gestational hypertension, Preeclampsia,Eclampsia.

Introduction

Hypertensive disorders of pregnancyis a challenging stigma in the field of obstetrics and one of major contributors to maternal and perinatal mortality. Pregnancy is associated with a group of physiological and pathological changes. Gestational Hypertension is a hypertensive disorder in pregnancy that occurs after 20 weeks of pregnancy in the absence of other causes

of elevated blood pressure (B.P.) i.e., >140/90 mm Hg measured 2 times with at least of 6-hour interval. Hypertensive disorders complicate 5-10% of all pregnancies.[1] Gestational hypertension is diagnosed when blood pressure reaches 140/90mm Hg or greater for the first time after mid pregnancy. Gestational hypertension associated with significant proteinuria(>300mg/ 24hr) or protein creatinine ratio more than or equal 30 mg/mmol or evidence of maternal organ dysfunction or uteroplacental dysfunction is termed as preeclampsia. Preeclampsia complicated by generalised tonic clonic convulsion or coma is termed as Eclampsia. Hypertension is the most significant primary sign. Oedema occurs initially in the lower legs but may progress to massive oedema or anasarca. It is a multisystem disorder which include cardiovascular,haematological, hepatic, renal, neurological abnormalities and ocular manifestations.[2,3]Severe toxaemia is the main cause for visual system involvement. The retinal vascular changes majority of times but not always correlate with systemic hypertension. The constriction of vessels may take days to develop and may last for weeks to months.

Retinal changes are liable to occur when the systolic pressure raises above 160 and the diastolic above 100mm hg and are marked when these limits reach 200/130 mm of Hg.[4,5] Choroid is also frequently affected in the disease; choroidal ischemia and infarction may occur. The ischemia of occipital lobe and optic nerve may occur and recovery usually occurs unless there is significant infarction. Sometimes visual disturbances may be the presenting symptom; less common symptoms include amaurosis, photopsia, scotomata, diplopia, achromatopsia and hemianopia. The abnormalities of the retina and the retinal vasculature are most frequent though the conjunctiva, choroid, optic nerve and the visual cortex may be affected. Visual loss as a result of vascular involvement is usual. Vision threatening conditions involve central retinal artery occlusion, secondary optic atrophy, macular tear, central serous retinopathy, retinal detachment, central retinal vein occlusion, choroidal ischemia and haemorrhage. Spontaneous vitreous haemorrhage may occur in cases of HELLP syndrome.

Material and methods

This cross sectional observational study was carried out in the Department ofObstetrics &Gynaecology and Department of Ophthalmology , GMC Srinagar from November 2015 to april 2016 after taking the approval of the protocol review committee and institutional ethics committee.

Inclusion criteria

All the patients who fulfilled the diagnostic criteria of Gestational hypertension, Preeclampsia or Eclampsiawere included in this study.

Exclusion criteria

Patients who had preexisting diabetes or hypertension or renal disease or hazy media which did not permit fundus visualization were excluded from the study.

After taking history for any eyesymptoms, anterior segment was examined with torch light on the bed itself. Both pupils were dilated with 1% tropicamide eye drops and fundus examination was done by ophthalmologist with direct ophthalmoscope in a semi dark room in the ward. Hypertensive retinopathy changes seen in right or left or both eyes, was taken as positive findings in that patient. Age, race, parity, blood pressure, proteinuria were noted from the case records. The PIH was graded as preeclamsia (mild and severe) and eclampsia. All the findings were noted on a data sheet.

The retinal changes (hypertensive retinopathy) were graded according to Keith Wagener classification into : Grade I- mild generalized arterial attenuation, particularly of small branches; Grade II-more severe grade I+focal arteriolar attenuation; Grade III-grade II+haemorrhages,hard exudates, cotton wool spots; Grade IV-grade III=optic disc swelling (papilloedema).[6] The severity of these hypertensive disorders was graded into Mild and Severe.Mild Gestational Hypertensive --- >140/90 but <160/110. Severe Gestational Hypertension --- >160/110. Mild preeclampsia --- BP >140/90mmHg, proteinuria+, Severe preeclampsia --- BP > 160/110mmHg, proteinuria ++ or +++, headache, cerebral or visual disturbances, epigastric pain, impaired liver function tests, and increased serum creatinine; Eclampsia --- severe preeclampsia + convulsions. Proteinuria was tested using dipstix method and was graded as + = 0.3gm/L, ++ =1gm/L, and +++= 3gm/L.[7]

The results were analyzed using SPSS 25.0 version. Chi-square test was used to determine the association between the retinal changes and blood pressure, proteinuria, and severity of hypertensive disorders. P value <0.05 was taken as significant.

Results

A total of 100 patients were examined. The mean age of patients was 31.2±6.2 years (range 20-50 years). The gestation period ranged between 25 and 41 weeks. 45 (45%) were primigravida , 33 (33%) were multigravidas and 22(22%) were grandmultiparas . 41(41%) had mild preeclampsia, 56(56%) had severe preeclampsia and 3(3%) had eclampsia.

Blurring of vision was present in 3 patients of severe preeclampsia, (visual acuity was 6/9 in both eyes in both patients) and in 2 patient of eclampsia (visual acuity was 6/12 in both eyes). The visual acuity was normal (6/6 in both eyes) in 97 patients. Retinal changes (hypertensive retinopathy) were noted in 58(58%) patients (Table 1).

The association between retinal changes and different parameters is shown in Table 2. There was statistically significant positive association between the presence of retinal changes and blood pressure (P =0.001), proteinuria (P=0.021) and severity of these hypertensive disorders.(P=0.027). However, Age(P = 0.44), Race (P=0.89) and Parity (P =0.37) were not associated with occurrence of retinopathy in our study.

Table 1: Retinal changes in hypertensive disorders of pregnancy (Gestational Hypertension, Preeclampsia ,Eclampsia)

Grades of retinopathy	Number	%
No changes	42	42%
Grade I	53	53%
Grade II	5	5%
Grade III	-	-
Grade IV	-	-

Table 2 The association of retinopathy with different variables in patients with hypertensive disorders of pregnancy (Gestational Hypertension, Preeclampsia ,Eclampsia)

		Retinal changes			
	Nil =42	Gr I =53	Gr II =5	Total	P value
<160mmHg systolic	36	28	0	64	0.001
<110mmHg diastolic					
>160mmHg systolic	6	25	5	36	
>110mmHg diastolic					
Proteinuria					

+	32	30	1	63	0.021
+ +	10	9	2	21	
+ + +	0	15	2	17	
Severity of disease Mild preeclampsia	24	16	1	41	0.027
Severe preeclampsia	18	35	3	56	
Eclampsia	0	2	1	3	
Age 20-30 years	22	32	1	55	0.44
30-40 years	15	18	3	36	
40-50 years	5	3	1	9	
Parity					
Primi	18	25	2	45	0.37
Multi	14	18	1	33	
Grand multi	10	10	2	22	

Discussion

In the present study, hypertensive retinopathy changes (grade I and II) were seen in 58% of patients. Haemorrhages, exudates and retinal detachment were not seen in any of the patients in this study. Since the Antenatal Care has improved , hypertension is detected early during the antenatal visits and treatment is started immediately. This could be the probable reason for the presence of only grade I and grade II hypertensive retinopathy changes in our study.

Hypertensive disorders of pregnancyare responsible for significant maternal deaths, especially in the developing countries. During the period 1997-2000, eclampsia was the cause of death in 7.8% and preeclampsia in 4.1% cases in Malaysia.[8]Rasdi et al.[9] from Malaysia studied a group of patients with hypertensive disorders of pregnancy (gestational hypertension, chronic hypertension, preeclampsia/eclampsia, chronic hypertension with superadded preeclampsia/eclampsia). The retinal changes were seen in 21.5% (5 out of 28 patients) of preeclampsia/eclampsia. They found generalized arteriolar narrowing (5/28), cotton wool spot (1/28), haemorrhage (1/28) and serous retinal detachment (1/28). They noted the resolution of all the above retinal changes except narrowing of arteries during the purperium period.

The visual system may be affected in 30% to 100% of thesepatients ; the most common abnormality seen in the fundus is narrowing of retinal arterioles. Various changes in the fundus and visual problems reported in patients of preeclampsia and eclampsia from different countries include spasm and focal/generalized narrowing of retinal arterioles, haemorrhages, exudates, peripapillary or focal retinal edema, serous retinal detachment[10] isolated cases of acute ischemic optic neuropathy[11] , transient blindness,cortical blindness[12-14], bilateral retinal detachment[15] , exudative retinal detachment in one eye and severe macular edema in the other eye[16] , retinal pigment epithelial lesions[17] , temporary decrease in vision secondary to severe retinal arteriolar spasm and retinal edema[18] , permanent blindness secondary to central retinal artery occlusion and optic atrophy.[19] Although transient blindness has been reported in 1% to 3% of patients with eclampsia[20] with current methods of treatment the present incidence is probably much lower. Optic atrophy secondary to retinal vascular involvement is unusual but may cause visual impairment.[18,21]

Jaffe and Schatz[22] from USA have reported significantcorrelation between the reduction in arteriole to vein ratio, number of focal arteriolar constrictions and severity of preeclampsia. They did not find any haemorrhages, exudates, cotton wool spots, or retinal detachment in their study of 17 mild preeclamptic and 14 severe preeclamptic patients.

In a study of 275 cases of preeclampsia and 125 cases of eclampsia, Reddy[23] from India has reported retinal changes in 53.4% preeclampsia and in 71.2% in eclampsia patients (over all 59% , 236 out of 400). The most common retinal change noted was narrowing of arterioles (45.7%, 183 out of 400 cases). He found that retinal changes were significantly more in patients with severe hypertension.

Tadinet al[24] from Croatia have reported 45% of retinal changes in their study of 40 patients with pregnancy induced hypertension (PIH). They found a statistical correlation between proteinuria, blood pressure and hypertensive retinopathy. The degree of retinopathy was directly proportional to severity of preeclampsia. They stated that hypertensive retinopathy is a valid and reliable prognostic factor in determining the severity of preeclampsia; examination of fundus is a valuable and necessary diagnostic procedure in pregnant women with preeclampsia.

Karki et al [25] from Nepal have reported 13.7% of fundus changes in their study of 153 subjects with PIH. They assessed the fetal outcome in these patients and concluded that retinal and optic nerve head changes were associated with low birth weight; choriodal and optic nerve head changes were associated with low Apgar score; and fundus evaluation in patients with PIH is an important procedure to predict adverse fetal outcomes.

The prevalence of hypertensive retinopathy changes (58%) seen in our study is higher than 13.7%[25] , 21.5%7 , 45%[24] , but similar to 59%[23] reported in the literature. The absence of haemorrhages and exudates observed in present study has been supported by Jaffe and Schatz.[22] Exudative retinal detachment is seen rarely in PIH patients. It is thought to be caused by choroidal ischemia.[26] Retinal pigment epithelial lesions, called Elscchnig spots, may also be found in preeclamptic patient with choroidal infarcts. The prognosis in these cases is good, with visual symptoms and retinal pigment epithelial changes resolve spontaneously within weeks of delivery.[17] Presence of macular edema or papilloedema or retinal detachment are the warning signs for termination of pregnancy to save the vision of the mother.[16] The management of retinal detachment is not surgery, but termination of pregnancy after controlling blood pressure so that vision can be saved in the affected eye.

Cortical blindness refers to reduced vision from bilateral damage to any portion of the visual pathways posterior to the lateral geniculate nucleus. Eye examination is typically normal, including a normal pupillary light reflex. It can occur in ante partum and postpartum period, lasting for several hours to several days in preeclampsia and eclampsiapatients.[27] Other presenting symptoms include headache,

seizures and loss of consciousness. MRI shows hypertense signals on T2-weighted images and hypotense signals on T1-weighted images in occipital cortex. These findings are consistent with transient ischemic events as a result of cerebral edema.[27] Management includes magnesium sulphate for seizure prophylaxis, anti-hyperetensives for severe hypertension, fluid restriction to avoid worsening of cerebral edema, ophthalmologic and neurologic consultation as well as neuroimaging. Prompt delivery is curative, with resolution of neuroimaging findings. The retinal changes were more often seen in patients with severe hypertension, severe proteinuria and severity of the disease in present study; they were significantly associated with these factors (Table 1). A similar association between hypertensive retinopathy and the above three parameters was reported in earlier studies.[23-25]

We did not find any case of serous retinal detachment in present study which is similar to the previously reported studies.[23-25] In general, it is believed that the presence of changes in the retinal arterioles and retinal haemorrhages may indicate similar changes in the placenta. Since the well being of the fetus depends on the placental circulation, ophthalmoscopic examination of mother's fundus may give a clue to similar micro-circulation changes in the placenta and indirectly to the fetal wellbeing. Fundus examination in patients with Hypertensive disorders of pregnancy is an important clinical evaluation to predict adverse fetal outcomes.

Conclusion

Fundus examination inhypertensive disorders of pregnancyis important in monitoring and managing cases as it correlates with severity and indirectly implies severity of changes in placental micro-circulation that can help to predict the fetal outcome and ocular morbidity.

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