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ORIGINAL ARTICLE

Serious Visual (Ocular) Complications in Pre-eclampsia and Eclampsia

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Abstract

Introduction Complete loss of vision is an uncommon ocular complication of pre-eclampsia/eclampsia. The conditions which lead to visual loss in pre-eclampsia include cortical blindness, retinal detachment, retinal vascular thrombosis and optic nerve atrophy.

Objectives The objective was to describe the cause, clinical course and prognosis in blindness complicating pre-eclampsia.

Methodology This is a prospective observational study conducted at the Govt. Hospital for Women and Children, Chennai, from January 2006 to December 2010. Sixteen women who were diagnosed with blindness complicating pre-eclampsia were analysed for the cause of blindness, clinical details and prognosis.

Results The incidence of blindness among women with pre-eclampsia and eclampsia was 0.17%. The cause of visual loss was cortical blindness in 14 patients and retinal detachment in two patients. Blindness manifested predominantly in the intrapartum and postpartum period in 13/16 cases (81.25%). Seven patients (43.75%) suffered from severe pre-eclampsia, and nine patients (56.25%) suffered from eclampsia. HELLP syndrome, gestational diabetes mellitus (GDM) and anaemia were seen in two patients each. Seven patients also presented with motor

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deficits. CT scan imaging showed cortical vein thrombosis in five cases, arterial infarcts in two cases, widespread hypodense areas in the occipito-parietal region in six cases. In patients with cortical blindness, recovery of vision occurred within 10 days.

Conclusion Cortical blindness and retinal detachment are rare complications of pre-eclampsia and eclampsia. The prognosis is usually good especially with cortical blindness where the loss of vision is transient. The mainstay of management is effective treatment of pre-eclampsia/eclampsia along with termination of pregnancy.

Keywords Pre-eclampsia · Eclampsia · Cortical blindness · Retinal detachment · Ocular complications

Introduction

Pre-eclampsia is a multisystem disorder in which the central nervous system (CNS) is most commonly affected. The common CNS manifestations are headache, convulsions, altered consciousness, visual disturbances and cerebrovascular accidents leading to stroke. Visual disturbances such as blurring of vision and photopsia are commonly seen among women with pre-eclampsia/eclampsia, but complete loss of vision is an uncommon neurological complication of pre-eclampsia. The conditions which lead to visual loss in pre-eclampsia and eclampsia include cortical blindness, retinal detachment, retinal vascular thrombosis and optic nerve atrophy [1, 2]. The objective of this study was to describe the demographic details, clinical course, ophthalmological evaluation findings, CT scan imaging findings, treatment and prognosis in sixteen patients who were diagnosed with blindness in association with pre-eclampsia and eclampsia.

Methodology

This was a prospective observational study conducted at the Govt. Hospital for Women and Children, Chennai, from January 2006 to December 2010. During the above period, 16 women were diagnosed with blindness in association with pre-eclampsia and eclampsia. In these 16 patients, the case records were analysed for demographic details, clinical data, risk factors and investigation results. All patients were evaluated by the neurophysician to assess the nature and severity of the neurological deficit. A detailed ophthalmological and fundus examination was carried out by the ophthalmologist. Neuroimaging by computed tomography (CT scan) was carried out in all the 16 women within 24 h of onset of visual loss. The patients were managed as per the hospital protocol for pre-eclampsia/eclampsia. Patients were closely monitored and reviewed by a team of doctors consisting of an obstetrician, anaesthesiologist, neurophysician and ophthalmologist. The prognosis and the time taken for recovery of vision were analysed. The patients were also followed up for a period of 1 year to assess the visual function.

Results

During the study period, there were 84,628 deliveries and 9199 of them (11.7%) were complicated by pre-eclampsia and eclampsia. Among these 9199 patients, 16 (0.17%) presented with blindness. After careful neurological and ophthalmological evaluation, the cause of visual loss was found to be cortical blindness in 14 patients and retinal detachment in two patients. A diagnosis of cortical blindness was made when the ophthalmological evaluation showed intact pupillary reflexes and normal findings at fundus examination [1]. In two cases, there was evidence of retinal detachment in both the eyes with haemorrhage, oedema and exudates.

Clinical profile of each patient is shown in Table 1. The patient characteristics, clinical data, CT scan findings and prognosis are summarized in Table 2. The mean age of presentation was 23.4 years. 81% (13/16) were aged between 15 and 24 years. On parity analysis, 62.5% (10) were para 1 and 18.75% (3) were multiparous women. Blindness manifested in the antenatal period in three patients (18.75%), in the intrapartum period in seven (43.75%) and in the postpartum period in six cases (37.5%). Seven patients (43.75%) suffered from severe pre-eclampsia, and nine patients (56.25%) suffered from eclampsia. Among these, two cases were also complicated by HELLP syndrome. There were also other medical complications such as GDM in two patients and moderate anaemia in two patients. Risk factors such as OC pill use, smoking, drug abuse, syphilis, type I diabetes and ischaemic heart disease were not present in all the 16 cases studied. On investigating, serum fibrinogen, ESR and leucocyte count were normal in all the 16 cases. The platelet count was normal in 14 cases and in two cases it was low in whom HELLP syndrome was also diagnosed. Antiphospholipid antibody levels were checked in all the 16 patients and were elevated in one case.

Blindness was preceded by intense headache in nine cases (56.25%), blurring of vision in three cases (18.75%) and headache and blurring of vision in four cases (25%). The duration of symptoms prior to blindness was <2 h in four cases. Among these, in two patients, the systolic and diastolic blood pressure were very high >200 and 150 mm of Hg, respectively. In these two cases, retinal detachment was diagnosed as the cause of blindness. The duration of

Table 1 Clinical profile of 16 patients with blindness in pre-eclampsia and eclampsia

No.	Age	parity	Timing	Risk factor	Highest systolic BP	Highest diastolic BP	Symptom	Neurofindings	CT findings	Cause of blindness	Outcome/ recovery of vision
1	18	0	AP	Eclampsia/ APLA	140	90	Headache	Hemiparesis	CVT Cerebral oedema	CB	Recovery in 1 day
2	25	2	IP	Pre-eclampsia	160	110	Headache	Nil	Normal	CB	Recovery—2 days
3	36	3	IP‘	Pre-eclampsia/ anaemia	170	116	Blurring	Hemiparesis	CVT Cerebral oedema	CB	Recovery—8 days
4	20	1	PP	Eclampsia/ HELLP	180	118	Headache	Hemiplegia/ aphasia	CVT Cerebral oedema	CB	Death
5	24	1	IP	Pre-eclampsia	180	130	Headache and blurring	Nil	Cerebral oedema	CB	Recovery—Day 10
6	20	1	PP	Eclampsia/ GDM	170	120	Blurring	Nil	Normal	CB	Recovery—Day 8
7	23	1	IP	Pre-eclampsia	160	118	Headache	Nil	Normal	CB	Recovery—day 1
8	23	1	PP	Eclampsia	160	120	Headache	Nil	Cerebral oedema	CB	Recovery—Day 4
9	21	1	IP	Pre-eclampsia	182	122	Headache	Hemiparesis	CVT Cerebral oedema	CB	Recovery—Day 2
10	27	2	PP	Eclampsia/ GDM	230	150	Headache and blurring	Hemiplegia	Arterial infarct Cerebral oedema	RD	Death
11	21	1	PP	Eclampsia	200	122	Headache	Nil	Cerebral oedema	RD	Recovery—Day 4
12	21	1	AP	Eclampsia	160	112	Headache	Nil	Cerebral oedema	CB	Recovery—Day 2
13	22	1	PP	Eclampsia	180	142	Headache and blurring	Aphasia	Arterial infarct Cerebral oedema	CB	Recovery—Day 2
14	18	1	IP	Pre-eclampsia	150	112	Headache	Nil	Cerebral oedema	CB	Recovery—Day 1
15	24	1	IP	Pre-eclampsia/ anaemia	162	112	Blurring	Nil	Cerebral oedema	CB	Recovery – Day 4
16	19	1	AP	Eclampsia/ HELLP	190	145	Headache and blurring	Hemiplegia	CVT Cerebral oedema	CB	Recovery—Day 4

CB cortical blindness, *RD* retinal detachment, *AP* antepartum, *IP* intrapartum, *PP* postpartum

symptoms was between 2 and 6 h in eight cases (50%) and was more >6 h in four cases (25%). On analysing the severity of the BP, the systolic BP ranged between 140 and 230 mm of Hg, and the diastolic BP ranged between 110 and 150 mm of Hg. The diastolic BP was between 110 and 140 mm of Hg in 12 cases, and four patients had a diastolic BP of >141 mm of Hg.

On neurological evaluation, hyperreflexia and ankle clonus were noted in all cases and other neurological manifestations such as hemiparesis/hemiplegia and

Table 2 Analysis of clinical data of 16 women who presented with pre-eclampsia/eclampsia and blindness

Patient characteristics	No.	%
Age in years		
15–19	3	18.75
20–24	10	62.5
25–29	2	12.5
>30	1	6.25
Parity distribution		
Para 0	3	18.75
Para 1	10	62.5
Para 2	2	12.5
Para 3	1	6.25
Timing of blindness		
Antepartum	3	18.75
Intrapartum	7	43.75
Postpartum	6	37.5
Risk factors		
Severe pre-eclampsia	7	43.75
Eclampsia	9	56.25
HELLP	2	12.5
GDM	2	12.5
Anaemia	2	12.5
Severity of diastolic BP		
90–110 mm of Hg	2	12.5
111–140 mm of Hg	10	62.5
>141	4	25
Preceding symptoms		
Intense headache	9	56.25
Blurring of vision	3	18.75
Headache and blurring	4	25
Duration of preceding symptoms prior to blindness		
<2 h	4	25
2–6 h	8	50
6–12 h	4	25
Time taken for recovery		
Day 1	3	18.75
Day 2	3	18.75
Day 4	2	12.5
Day 8	5	31.25
Day 10	1	6.25

dysphasia/aphasia were noted in seven cases. In these cases, by CT scan imaging five were diagnosed as cortical vein thrombosis (CVT) and two cases as arterial infarcts. Following the manifestation of blindness, over a period of time two patients went into unconscious state and eight patients presented with altered sensorium. On ophthalmic evaluation, pupillary reflexes were normal in 14 cases and there was evidence of arteriolar narrowing without exudates in 10 patients. In two cases, there was evidence of retinal detachment in both the eyes with grade III retinopathy.

For neuroimaging studies, only CT scan was available and the findings were normal in three cases. In five cases, findings were suggestive of cortical vein thrombosis (CVT), in six cases there were widespread hypodense areas in the parieto-occipital region suggesting oedema and petechial haemorrhages and in two cases there were findings suggestive of arterial infarcts. At the time of manifestation of blindness, eight patients were in active labour and all were delivered by the vaginal route, and the rest were delivered by caesarean section. All patients were delivered within 6–12 h of diagnosing blindness. Six patients developed blindness in the postpartum period.

In 13 patients diagnosed with cortical blindness, the duration of blindness ranged between 12 h and 10 days. In all cases, there was improvement in vision with perception of bright light within 12 h, but complete recovery was noted from 12 h to 10 days. In one case who was diagnosed with retinal detachment, within 6 h of termination of pregnancy and BP control, there was transient recovery of vision and complete recovery was noted in 5 days. Visual acuity, visual field testing and fundus examination were carried out every 72 h. At 2 weeks follow-up, the visual acuity, papillary reflexes and fundus examination were normal. After discharge, the 6-month and 1-year evaluation also remained normal.

There were two maternal deaths in this series. The first case, para 2 with GDM, developed postpartum eclampsia and manifested with hemiplegia and blindness on the second postnatal day. Her highest BP was 230/150 mm of Hg. CT imaging revealed extensive arterial infarcts, and retinal detachment was diagnosed on fundus examination. She rapidly progressed to unconscious state and died in spite of effective measures. The second case presented with intrapartum eclampsia with HELLP syndrome. On the first postnatal day, she developed hemiplegia, aphasia and blindness. CT imaging was suggestive of CVT, and there was evidence of widespread hypodense areas in the occipital cortex. Fundus examination was normal. Though vision started improving with perception of bright light, she developed intractable pulmonary oedema and died.

Discussion

Pre-eclampsia and eclampsia cause significant maternal and perinatal morbidity and mortality worldwide. It is a multisystem disorder secondary to generalized vasospasm and endothelial damage. The central nervous system is most commonly affected; patients may present with headache, convulsions, visual disturbances and cerebrovascular

accidents. Among the visual manifestations, blurring of vision and photopsia are very common in severe pre-eclampsia and eclampsia, but complete blindness is a rare neurological manifestation. It may result from cortical blindness, exudative retinal detachment and optic neuropathy secondary to ischaemia [1]. Retinal vein occlusion leading to blindness has also been reported [2].

Cortical blindness is a clinical condition characterized by intact pupillary reflexes and normal findings at fundus. Cortical blindness results from petechial haemorrhages and focal oedema in the parieto-occipital area affecting the ocular region. The posterior circulation is primarily affected due to the sparse sympathetic innervation of the posterior circulation compared to the anterior cerebral territories. As the posterior circulation is poorly innervated, in the presence of acute hypertension, the autoregulatory system of the sympathetic system is lost causing disruption of the blood brain barrier leading to vasogenic oedema. Posterior reversible encephalopathy syndrome may cause cortical blindness and is associated with pre-eclampsia and eclampsia [3]. Acute onset of visual symptoms in pregnant women can be the first sign of pre-eclampsia [4].

Being a rare complication of pre-eclampsia, the incidence of blindness in pre-eclampsia is not known. However, in our study blindness was seen in 16 of the 9199 (0.17%) pre-eclampsia/eclampsia cases. Blindness due to pre-eclampsia can occur at any period of gestation. In our analysis, in 13 of the 16 cases, blindness manifested in the intrapartum and postpartum period. There have been reports of blindness occurring in the antepartum period [5]. Blindness occurring in the antepartum period is an indication for terminating the pregnancy immediately. In three of our patients, blindness occurred in the antepartum period, and they were delivered by caesarean section within 12 h.

Risk factor analysis showed that besides hypertension there were also other risk factors such as GDM, anaemia and the presence of antiphospholipid antibody. Hypertension is found to be the single most important risk factor for the occurrence of blindness as high BP, blurring of vision and intense headache preceded blindness in all the cases, and these symptoms were seen 2–6 h prior to the manifestation of blindness. Therefore, it is important for the clinicians to anticipate complications such as blindness and cerebrovascular accidents in patients presenting with intense headache and high BP.

There could be associated lesions at other sites in brain as well. Manifestations of pyramidal dysfunction such as clonus, plantar extensor, hemi paresis/hemiplegia and aphasia have all been reported. In our analysis, seven patients had neurological manifestations such as hemiparesis, hemiplegia and aphasia. In these cases, CT scan, diagnosed 5 cases with CVT and two with arterial infarcts.

Cortical blindness is generally reversible, and permanent blindness from retinal vascular changes is rare [6]. Blindness in pre-eclampsia might be reversible, if the neuroimaging studies are associated with petechial haemorrhages, ischaemia and focal oedema in the occipital cortex region. In our analysis, in women diagnosed with cortical blindness, the duration of blindness ranged from 12 h to 10 days. In all patients, there was perception of bright light within 24 h and complete recovery was noted as early as 12 h. Case studies have reported complete recovery of vision within 7 days [7].

Retinal detachment is an unusual cause of visual loss in pre-eclampsia. Due to severe hypertension, there is separation of the neurosensory retina from the pigmented retinal epithelium leading to visual loss. Management of retinal detachment in pre-eclampsia is conservative and involves treating the underlying condition. Prognosis is good, and spontaneous resolution usually occurs with adequate control of BP and delivery. The finding of retinal detachment is an indication for terminating pregnancy. After delivery, the sub-retinal fluid is reabsorbed and the visual acuity returns within weeks. However, if there is extreme necrosis of the pigmented retinal epithelium, permanent visual loss may occur [8]. Eugene et al. have reported that ocular manifestations and visual sequelae usually reverse with prompt termination of pregnancy [9].

In our study, in the two cases in whom retinal detachment was diagnosed, the systolic and diastolic BP were very high prior to the manifestation of blindness. However, within 6 h of termination of pregnancy and BP control, in one case transient recovery of vision was noted and complete recovery was noted in 5 days. The other case died as the systolic and diastolic BP was very high, and multiple arterial infarcts were reported on CT imaging.

The radiological findings in cortical blindness range from normal to widespread low-density areas in the parieto-occipital region by CT scan. MRI studies demonstrate high signal intensity areas related to focal cerebral oedema and ischaemia [5, 6]. During the study period, only CT scan imaging was available and was reported as normal in three cases; 13 cases showed hypodense areas in the occipito-parietal region. MRI and CT scan imaging studies have shown that cortical blindness results from vasogenic (hydrostatic) cerebral oedema and not due to cerebral vasospasm [1, 10]. Other than effective treatment of pre-eclampsia/eclampsia and termination of pregnancy, no specific therapy is indicated in pre-eclamptic women who experience ocular changes. While controlling hypertension, rapid reduction of BP should be avoided. It has been suggested that aggressive treatment of hypertension is likely to exacerbate the neurological damage [11].

Conclusion

Though visual disturbances are very common among pregnant women with pre-eclampsia/eclampsia, rare but serious complications such as cortical blindness/retinal detachment, retinal artery and vein occlusion and optic atrophy can also occur. Clinicians should be aware of these ocular manifestations and careful ophthalmological and neurological evaluation should be carried out along with neuroimaging to ascertain the various causes of blindness in pregnancy. The prognosis is usually good especially with cortical blindness where the loss of vision is transient. The mainstay of management is effective treatment of pre-eclampsia/eclampsia along with termination of pregnancy.

Compliance with ethical standards

Conflict of interest The author declares that they have no conflict of interest.

Ethical approval Ethtical committee approval was not obtained initially, as the condition is very rare. However, over a period of time 16 cases were collected, therefore, decided to publish it.

Informed consent As most of the patients recovered, oral consent was obtained from them to publish as case reports.

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