



AKADÉMIAI KIADÓ

Review of the ophthalmic symptoms of preeclampsia

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Developments in Health Sciences

3 (2020) 1, 21-23

DOI:
10.1556/2066.2020.00005
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Received: May 05, 2020 • Revised manuscript received: May 16, 2020 • Accepted: May 20, 2020
Published online: October 20, 2020

REVIEW ARTICLE



ABSTRACT

Preeclampsia is a severe, sometimes life-threatening complication of pathological pregnancies. The incidence of neonatal morbidity and mortality is usually increased. Besides general maternal symptoms like hemolysis, low platelet number, elevated liver enzyme level, proteinuria, cardiovascular problems, neurological and cerebral complications, serious ophthalmic symptoms might occur. These include focal or generalized narrowing of the arterioles, flame-shaped retinal haemorrhages, and cotton-wool spots. Rarely, disc swelling, exudative retinal detachment, cystoid macular edema, bilateral occipital lobe infarction, or cortical blindness might occur. In this article, I review the retinal and macular changes, retinal detachment, and the cause of blindness. Optical coherence tomography (OCT) allows ophthalmologists to diagnose early and late changes in choroid vasculature and circulation, and consequent retinal morphological changes. Spectral-domain OCT and enhanced depth imaging provide important insight and possible prognosis for the course of the disease. After termination of the pathological pregnancy, vision returns to normal in most cases; unfortunately, there are some exceptions.

KEYWORDS

pregnancy, preeclampsia, vision, ocular complication, choroidal changes, retinal complication

INTRODUCTION

Preeclampsia is a severe complication of pregnancy and a possible cause of maternal morbidity and mortality. It is a multisystem hypertensive disorder with a wide clinical spectrum that includes severe preeclampsia, eclampsia, hemolysis, elevated liver enzymes, low platelet number, proteinuria, and HELPP syndrome. It can affect the cardiovascular system and cause hematologic abnormalities, hepatic problems, renal insufficiency, and neurologic and cerebral complications. Besides these general health problems, the visual system might also be slightly or quite severely affected [1].

Neonatal morbidity and mortality are also increased in preeclampsia and eclampsia. Fetal growth retardation, preterm delivery, placental abruption, low birth weight, asphyxia, low Apgar values, still birth, and death during delivery are the most frequent complications. The pathophysiology is still not fully understood, but placental insufficiency and endothelial dysfunction might be among the most important factors leading to preeclampsia.

The incidence is 3–5% of pregnancies. The leading complaints are headache, severe proteinuria, visual disturbances, and blurred vision or loss of vision. Usually, only one eye is affected, but sometimes both. The pathophysiology includes damage to small vessels within the womb and vasogenic edema within the central nervous system.

In this article, I review the ophthalmic signs and complications of preeclampsia and eclampsia, including hypertensive retinopathy, cystoid macular edema, serous retinal detachment, and cortical blindness.

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Ophthalmic complications and signs of preeclampsia and eclampsia

Fundus changes in hypertensive retinopathy include focal or generalized narrowing of the arterioles, flame-shaped retinal haemorrhages, and cotton-wool spots. Rarely, disc swelling, exudative retinal detachment, bilateral occipital lobe infarction, or cortical blindness might occur [2].

The important risk factors of preeclampsia are advanced age, obesity, hypertension, renal disease, diabetes mellitus, in vitro fertilization, lupus erythematosus, multiple pregnancies, and a history of previous preeclampsia [1, 3].

Promptly started delivery in preeclamptic patients usually prevents maternal and fetal complications. Placental abruption, postpartum hemorrhage, need for blood transfusion and perinatal mortality also decreases. Preeclamptic women are more likely to undergo a cesarean section than have a normal childbirth.

In preeclamptic pregnancies, about one-third of the patients show some kind of ophthalmic symptoms, including scotomas, hypertensive retinopathy, serous retinal detachment, and cortical blindness. Symptoms vary from transient visual loss to severe visual loss because of serous retinal detachment, to cortical blindness [4, 5]. Visual problems occur in 25% of patients with preeclampsia and almost 50% with eclampsia. Blurred vision, photopsia, photophobia, inability to focus on reading and complete blindness may occur.

Retinopathy in preeclampsia

Preeclamptic retinopathy resembles hypertensive retinopathy because the choroid and the optic nerve can be damaged. The difference is that the damage is usually reversible. The narrowing and twisting of retinal arterioles into a corkscrew shape is a very characteristic change. Systemic hypertension finally leads to vasoconstriction and consecutive extravasation of fluid to the extracellular space. Other retinal signs are cotton-wool spots, a decreased ratio of arterioles to venules, and intraretinal haemorrhages. The narrowing of the arteriolar vessels returns to normal after delivery. The examiner should assess and concentrate at funduscopy, the arteriovenous crossing signs, hard and cotton-wool exudates, retinal haemorrhages, and optic nerve swelling.

Macular changes in preeclampsia and eclampsia

Soon after its development, optical coherence tomography (OCT) was used to detect retinal and macular changes in preeclampsia [3, 6]. The changes within the choroid are also important, and different techniques of OCT imaging provide detailed information about choroidal vascular and circulation changes. The development of spectral-domain OCT (SD-OCT) provided the means to describe posterior pole changes. Recently, enhanced depth imaging OCT (EDI-OCT) has been developed. The choroid lies below the retina and is very important to its nourishment. EDI-OCT technology allows ophthalmologists to visualize cross-sections of

the choroid and measure its thickness. Without EDI-OCT, ophthalmologist could only measure the choroidal thickness with the aid of an ultrasound B-scan, and there was no information about the fine structure of the choroid and its vessels. The combination of OCT and angiography produced the OCTA technique, which non-invasively shows the fine vasculature of the retinal and the choroidal vessels. The latest technology provides information about the decreased density of the superficial and deeper retinal vessels [6].

Kim et al. [7] studied normal pregnancies and pregnancies with preeclampsia and found that normal pregnancy did not cause an increase in choroidal thickness, but preeclamptic pregnancy did. The thicker choroid might give rise to hyperpermeability of the microvasculature, which might cause serous retinal detachment, but the subfoveal choroidal thickness normalized within 1 week after termination of the preeclamptic pregnancies [7].

Sayin et al. [8] used EDI-OCT technology and found that choroidal thickness increased also in normal pregnancies. Surprisingly, they found that in preeclampsia choroidal thickness was quite similar to non-pregnant women. This might be explained by the hypothesis that in preeclampsia systemic vasospasm causes a decreased thickness of choroidal vasculature measurable by EDI-OCT technology [8].

However, it is postulated that preeclampsia might cause spasm of the choroidal small arterioles, causing ischemia and increased permeability, leading to the appearance of serous fluid under the foveal area. Despite different measurement results, it is important to provide information about choroidal thickness, choroidal circulation, and the small vessel structure.

It has also been shown with an OCTA series that ocular blood flow within the central retinal area of the choriocapillaris layer is decreased in preeclampsia [6]. To judge what is occurring in the peripheral retina is also important; at the moment, however, OCTA can detect changes only within 10.0 mm of the central retina. Traditional angiography with fluorescein and wide-field examination might give more information about the peripheral retina [7].

In an earlier study, Somfai et al. [3] found that cystoid macular edema (CME) and serous retinal detachment might occur in preeclamptic women. Although OCT assessment of the choroid structure might give detailed information about its fine microvascular structure and circulation, it is difficult to perform in severe preeclampsia because pregnant women are difficult to transport to the ophthalmic departments. Development of a portable OCT device would help solve this problem.

Serous retinal detachment

Serous retinal detachment means separation of the neurosensory retina from the retinal pigment epithelium, causing a significant visual loss for the affected patients. The prevalence is around 1% among patients with preeclampsia. The retinal detachment is bullous in nature and frequently can be presented in both eyes. Serous retinal detachment can



appear any time during the pregnancy, but most cases present just before or after delivery. Most cases do not require surgery and resolve spontaneously. Following birth, the subretinal fluid is absorbed by the retinal pigment epithelial (RPE) layer, and vision starts to improve, but it can take weeks before returning to normal. Very rarely, the visual loss might be permanent, due to pigment epithelial necrosis [9].

Very rarely proliferative vitreoretinopathy may occur, mainly in patients who suffered previously from diabetes mellitus. Also, microthrombi formation might be a cause for late-onset proliferative retinopathy without diabetes in medical history.

Blindness

Cortical blindness is one of the most serious and frightening complications of preeclampsia and eclampsia, but it is usually thought to be reversible after the termination of pregnancy. Researchers think it is due to cerebral vasospasm and consecutive ischemia. It also may arise from the previously mentioned vasospasm mechanism in cerebral vessels and increased permeability within cerebral capillaries [9]. Small petechial hemorrhage and occipital edema have also been implicated. The diagnosis is difficult because small changes cannot be verified with imaging. Cortical blindness is usually found in 1–5% of patients with severe preeclampsia and eclampsia [9]. It might be the first warning symptom before seizures start. Usually, seizures start about 4–8 h after cortical blindness. Neuroimaging might show anything from normality to hypodensity in the occipital lobes [10]. Cortical blindness is reversible in most cases, usually within 8 days.

DISCUSSION AND CONCLUSIONS

It can be concluded that, in cases of preeclampsia, assessment of both visual performance and retinal imaging, especially the macular and submacular areas are of great importance and a great help for obstetricians deciding whether to terminate the pregnancy or to try to prolong it as long as possible. Ophthalmic symptoms and signs might be as important as assessments such as proteinuria or labor changes, and treatments such as hypertension control. Development of a portable OCT device for the pathological pregnancy wards would save much of the time and energy currently spent getting patients assessed in the ophthalmic wards. Severe preeclampsia and eclampsia are emergency cases. In obstetrics wards, quick termination of pregnancy

usually helps normalize the ophthalmic conditions of the mother and the general medical condition of both mother and newborn.

Conflicts of interest and funding: The author declares no conflict of interest and no financial support was received for this study.

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