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A Seminar Paper: The Ophthalmic Manifestations of Pregnancy

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Abstract

The hormonal, structural and physiological system changes that occur normally during pregnancy can affect the ocular functions of the mother's eyes. These ocular manifestations of pregnancy are usually transient in nature but some may occasionally be permanent. Apart from the physiological changes that occur in ocular tissues during pregnancy, pathological disorders may occur also. While pregnancy can worsen pre-existing ocular conditions such as diabetic retinopathy, it can actually have beneficial effects on others like glaucoma and uveitis. Disorders arising from pregnancy, such as pre-eclampsia and eclampsia, can also have adverse effects on ocular tissues. This seminar work will review and discuss the ocular manifestations of pregnancy under the following sub- headings; the effect of pregnancy on pre-existing eye disorders, ocular changes developing during pregnancy, the disorders of the eyes associated with pregnancy-related diseases and neuro-ophthalmological changes in pregnancy.

Keywords: Pregnancy; Ocular Manifestations; Eye Disorders; Neuro-Ophthalmological; Ocular; Tissues

Introduction

According to Glaze WD [1], pregnancy, otherwise known as gestation period, is a process comprising the growth and development of a new individual within a woman, from conception, through the zygotic, embryonic and foetal periods, to birth. It lasts approximately 266 days [38 weeks] from the day of fertilization, but clinically, it is considered to last for 280 days [40 weeks or 9 months] from the first day of the last menstrual period. After fertilization has occurred, the fertilized egg [also known as the zygote] travel from the fallopian tube back to the uterus. It attaches itself firmly to the specially thickened uterine lining, in a process known as implantation [2].

Ophthalmic Manifestations of Pregnancy

The ophthalmic manifestations of pregnancy are the ocular changes that arise as a result of hormonal, structural and physiological system changes during pregnancy. Women experience an appreciable number of both systemic and ocular changes during pregnancy [3].

Hormonal changes are among the most common systemic changes in pregnant women. The placenta, maternal endocrine glands and foetal adrenal gland combine their productivity to produce a high-powered hormone factory. The increased hormonal activities cause the immune system to become more suppressed, leaving the pregnant woman more exposed to serious immunological disorders [3,4].

The ocular changes that may arise from the various maternal changes that occur during pregnancy are more commonly transient but occasionally, some may become permanent. The ophthalmic manifestations of pregnancy may be physiological or pathological or may be modifications of pre-existing conditions. Visual changes in pregnancy

are common occurrences and many are associated with pregnancy itself, specifically [3].

The Ophthalmic Manifestations of Pregnancy may be Divided into:

- Ocular changes and disorders that develop during pregnancy.
- The effects of pregnancy on pre-existing eye disorders.
- Disorders of the eye associated with pregnancy related diseases.
- Neuro-ophthalmological changes in pregnancy [3,5].

Ocular Changes and Disorders that Develop During Pregnancy

Chloasma: This is the appearance of a tan or brown pigmentation on the forehead, cheek, nose and around the eyes of a pregnant woman. This discolouration tends to fade slowly after delivery [1].

Ptosis: Ptosis is defined as the drooping of the eyelids [1]. Research has shown ptosis to occasionally occur during and after normal pregnancy and it has been ascribed to fluid retention and hormonal changes. It clears on its own and therefore requires no treatment [6].

Effects of Pregnancy on the Cornea: Corneal sensitivity has been found to decrease in the later stage of pregnancy but it usually returns to normal by the 8th week after delivery [7]. Also reported that pregnancy transiently increases corneal thickness as a result of fluid retention by the body of the pregnant woman. This increase in corneal thickness may alter the refractive index of the cornea too. The pregnant woman may experience blurred vision. Contact lens wearers may find it increasingly difficult to continue wearing them due to this increase in corneal thickness during pregnancy [8,9].

Effects of Pregnancy on Accommodation: According to Duke-Elder S [10], pregnant women may experience transient loss of accommodation during and after pregnancy. Transient accommodative insufficiency and paralysis in accommodation has been associated with lactation.

Effects on the Lacrimal Apparatus: Reduction in tear production has been reported during pregnancy, attributed the disruption of the lacrimal acinar cells by increased hormonal changes. As a result of this, the possibility of dry eye syndrome, infection and localized trauma is increased [3]. Dry eyes can make contact lens wear irritating and uncomfortable. Artificial tears should be prescribed to the patient for use until tear production is normalized [11].

Effects on the Refractive Status of the Eye: As reported earlier in this write up, fluid retention, a common side effect of pregnancy, can change the shape and thickness of the cornea. When these changes happen, the patient may report blurred or distorted vision. These changes are transient, fortunately, and therefore subsides after delivery or after the mother stops breastfeeding [11,3]. advised that the patient be made aware of these changes in vision and counseled on the fact that any spectacle prescribed during this period may become unsuitable after delivery. Therefore, any change in spectacle prescription should be postponed until several weeks after childbirth.

Effects on Intraocular Pressure: Researches have shown intraocular pressure to decrease during the 2nd trimester of pregnancy and persists for several months after childbirth [12]. This reduction was attributed to an increase in the aqueous outflow during the period of pregnancy via one of several possible mechanisms including increased uveoscleral outflow due to hormonal changes, etc [13].

Ocular Migraine: According to Callaghan N [14], it has been found that the prevalence of migraine headaches is higher among women, suggesting that hormone levels, especially that of oestrogen, influences the occurrence, frequency and severity of migraine attacks. He reported that both increased and decreased frequencies of migraine headaches during the period of pregnancy have been noted.

Effects on Visual Field: There have been contradictory reports on visual field changes during pregnancy. The most popular opinion is that there is a bi-temporal hemianopsic visual field changes during pregnancy. However, it has been reported that the visual field of a pregnant woman may change, varying from slight temporal or concentric contraction to complete homonymous hemianopsia. These changes have been attributed to the changes in the pituitary gland during pregnancy, which may in turn affect the optic chiasm. These asymptomatic visual field changes have been reported to completely reverse after delivery [3].

Effects of Pregnancy on Pre-Existing Ocular Disorders Non-Infectious Uveitis:

Non-Infectious Uveitis: The immunosuppressive effects and high steroid level that occur in pregnant women may improve pre-existing uveitis during pregnancy but there is risk of relapse after delivery [15].

Ocular Toxoplasmosis: Toxoplasmosis is caused by Toxoplasma gondii, a protozoan intracellular parasite that can be acquired congenitally via an acutely infected mother or ingestion of infected meat [1]. This parasite attacks the retina, causing macular scar amongst other damages. Pregnancy may reactivate latent ocular toxoplasmosis in a pregnant woman that has previously suffered from the

infection. These patients are usually treated in a similar fashion as those that are not pregnant. Since pyrimethamine is a potential teratogen, spiramycin has been recommended as a safer and equally effective alternative [16].

Uveal Tumours: Recent research suggests that oestrogen and progesterone do not play any role in the development and/or progression of uveal melanomas. However, choroidal hemangiomas have been reported to show rapid growth during pregnancy but some can regress after delivery [15].

Retinal Disorders: There has been evidence of progression of retinitis pigmentosa in pregnant patients. It was found that this progression is not uniformed; there can be periods of more rapid worsening alternating with periods of relatively little changes. It therefore becomes difficult to interpret whether the changes reported are merely coincidental or truly pregnancy related [3].

Diabetic Retinopathy: According to Maayah J [17], diabetic retinopathy has been reported to be one of the leading causes of blindness in adults between the ages of 24-64 years and half of this period corresponds to peak fertility and child bearing years. Diabetes mellitus escalates during pregnancy as a result of increase in hormonal, metabolic and circulatory changes during this period. Therefore, pregnancy is considered a major risk factor in the development and progression of diabetic retinopathy and an independent risk factor in its development and progression in women with insulin-dependent diabetes mellitus [3]. Progression of diabetic retinopathy was found to be higher in women with moderate to severe forms of retinopathy at conception than in women with mild or no retinopathy at conception [3]. Gestational diabetes was found to pose a very low risk for the development of retinopathy [13,18].

Grave's Disease: According to Somani S [16], the severity of Grave's disease was found to increase during the 2nd trimester of pregnancy or even after delivery, in pregnant patients. The disease becomes quiescent during the latter stage of pregnancy. Pregnant patients with Grave's orbitopathy are treated in a similar fashion as non-pregnant patients [16].

Multiple Sclerosis: Much like the other inflammatory conditions, multiple sclerosis was found to stabilize or even improve in pregnant patients. However, there exists an increased risk of relapse after delivery [16].

Disorders of the Eye Associated with Pregnancy-Related Diseases

Pre-Eclampsia and Eclampsia: According to Glaze WD [1], pre-eclampsia is an abnormal condition of pregnancy characterized by the onset of acute hypertension after the 24th week of gestation. Symptoms include hypertension, proteinuria and oedema. Eclampsia, characterized by the development of generalized tonic-clonic seizures, arising as a result of pre-eclampsia that was not properly managed, occurs in up to 2% of women with pre-eclampsia. Eclampsia is an obstetrical emergency because both mother and foetus are at immediate risk of death or long term neurological complications. The only cure is the prompt delivery of the foetus and placenta [5]. Retinal changes usually occur when the diastolic blood pressure value is more than 100mmHg and systolic blood pressure value is above 150mmHg. The severity of retinal changes depends on the degree of hypertension [3]. Visual disturbances as a result of pre-eclampsia include; scotoma, photopsia, diplopia and reduced vision. The three most common visual complications are; hypertensive retinopathy, cortical blindness and exudative retinal detachment [5].

Hypertensive retinopathy: This is the most common ocular manifestations of pre-eclampsia and eclampsia, occurring in 60% of the patients. Ophthalmoscopic findings may include; focal arteriolar spasm and narrowing. These may be followed by secondary manifestations such as; diffused retinal oedema, retinal haemorrhages, exudates and cotton wool spots [19]. Arterial narrowing was found to reverse after delivery in majority of patients [3].

Exudative retinal detachment: This occurs in 1% of pre-eclamptic patients and up to 10% of eclamptic patients [20]. It is thought to be as a result of choroidal ischaemia. The prognosis is good with visual symptoms and retinal pigment epithelial changes resolving spontaneously within weeks after delivery [3].

Cortical blindness: This refers to the reduction in vision from bilateral damage to any portion of the visual pathway posterior to the lateral geniculate nucleus. It is seen in about 15% of pre-eclamptic and eclamptic patients [3]. Cortical blindness can occur both during pregnancy and after delivery, lasting from several hours to several days [5].

Other Ocular Complications That May Arise as a Result of Pre-Eclampsia and Eclampsia

Disseminated Intravascular Coagulation [DIC]: The association of pregnancy with hyper-coagulable state can affect the retina and choroid. DIC is seen in very severe pre-eclampsia. The choroidal involvement may cause serous retinal detachment, which usually resolves with the resolution of DIC, leaving retinal pigment changes as a permanent feature [3,18,21].

Thrombotic Thrombocytopenic Purpura [TTP]: This is a rare ocular condition that can develop during pregnancy

in the presence of severe pre-eclampsia. Visual symptoms occur in approximately 10% of patients and they are related to serous retinal detachment, arteriolar constriction and optic disc oedema [3]. Other ocular findings that may present are; retinal haemorrhages, exudates, sub-conjunctival haemorrhages, anisocoria, motility disturbances, ischaemic optic neuropathy, homonymous hemianopsia and scintillating scotoma [15].

Central Serous Retinopathy [CSR]: This is a condition characterized by neuro-sensory retinal detachment, with associated retinal pigment epithelial detachment, retinal pigment leakage, as well as retinal pigment epithelial and choroidal hyper-permeability [15]. The haemodynamic, biological and psychological alterations of pregnancy may lead the at-risk pregnant women to develop Central Serous Chorioretinopathy. Therefore, any pregnant patient that presents with the following symptoms; reduced visual acuity, central scotoma, micropsia or metamorphopsia, should be properly monitored for CSR [3,21].

Neuro-Ophthalmological Changes in Pregnancy

Venous Sinus Thrombosis: Pregnancy has been found to increase the susceptibility of patients to venous sinus thrombosis [3]. Thrombosis of the superior sagittal sinus or lateral sinus will result in increased intracranial tension leading to papilloedema. Lateral sinus thrombosis starts unilaterally but can become bilateral with the spread of thrombosis to the previously unaffected eye. Clinical signs may include:

- Proptosis
- Chemosis
- oedema of the eyelids
- III, IV and VI cranial nerve palsy, leading to ptosis and complete external ophthalmoplegia and a fixed and dilated pupil because of the involvement of the pupillary fibres.
- Cortical blindness may result, depending on the severity of thrombosis. Initial treatment should be intravenous heparin. Thrombolysis may be used for women who develop secondary deterioration [3].

Pituitary Tumour: Pituitary adenoma is a potential a potential risk for pregnant women because the gland demonstrates physiological growth during pregnancy [3]. Patients with micro-prolactinomas [otherwise known as adenomas], rarely present to the clinic with visual disturbances. Patients with macroprolactinomas usually present headache as the first symptom, followed by progressive visual field abnormalities, bi-temporal hemianopsia being the most common one. Other ophthalmic manifestations include; optic atrophy secondary to ischaemia as well as strabismus. Bromocriptine, a dopamine agonist, has been shown to inhibit prolactin production, decrease tumour volume and consequently reduce visual field defects. This drug is safe in pregnancy with no increase in maternal or foetal morbidity or mortality [3]. It may be given to asymptomatic patients as a preventive measure [22].

Meningiomas: These constitute 15%-20% of all intracranial tumours and are more prevalent in women than men [23]. Although its incidence does not increase in pregnancy, meningioma exhibits rapid growth that may cause acute vision loss. This may be attributed to the presence of oestrogen and progesterone in tumour cells. It has been found to relapse after delivery [3]. For mild vision loss in a pregnancy is close to term, no treatment is required. If the vision loss is severe and pregnancy is close to term, the foetus should be immediately delivered by cesarean section, followed by surgical resection of the tumour. For patients whose symptoms present early in pregnancy, medications like steroids and hyperosmotic agents can be used to decrease cerebral oedema. This enables the delay of surgery until the foetus is matured enough for delivery [3]

Benign Intracranial Hypertension [Bich]: This is defined as raised intracranial pressure in the absence of an intracranial mass or enlargement of the ventricles due to hydrocephalus. BICH usually occur in the 1st trimester of pregnancy but can also occur at anything during pregnancy. It may be asymptomatic or present with headaches and visual symptoms. Visual field defects are the most common visual disturbances. The visual disturbances in pregnant women are the same with those experienced by women who are not pregnant and treatment is the same too [3].

Optic Neuritis and Neuropathy: Optic neuritis may be caused by multiple sclerosis. The severity of multiple sclerosis decreases during pregnancy but rises significantly during the first three months after delivery. Optic neuritis may also occur as a result of vitamin B complex deficiency, due to vitamin loss or insufficient intake during pregnancy [3].

Conclusion

Having known the ocular changes that can manifest during pregnancy, careful monitoring of pregnant patients is necessary in order to differentiate between ocular physiological changes, ocular manifestations of systemic diseases and ocular diseases that may arise due to pregnancy. This careful evaluation is a must for proper management of the mother's ocular and systemic health, as well as foetal health.

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