

Pregnancy induced ocular changes

Abstract

Pregnancy is often associated with ocular changes which may be more commonly transient but occasionally permanent. The ocular effects of pregnancy may be physiological or pathological or may be modifications of pre-existing conditions. The ophthalmological manifestations occurring during pregnancy may be pre-existing before pregnancy or may be aggravated or induced by pregnancy itself. Irrespective of the visual health status of the pregnant women, regular perinatal eye examination should be scheduled in order to assure continuous surveillance of healthy eyes. Careful surveillance for appropriate and timely diagnosis is imperative for understanding management. The aim of this review is to elaborate the physiological and pathological changes occurring in the eye during pregnancy and the needful management.

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Introduction

Pregnancy is a state of physiological metamorphosis and women undergo a multitude of changes affecting nearly all the organ systems of the body. The vast majority of these changes occur to accommodate the body to the growing baby and to make the body fit for the upcoming labour and delivery. Tremendous changes have been documented to occur in the hormonal, metabolic, cardiovascular, immunological and haematological systems of the body, of which the hormonal change is one of the most prominent.^{1,2} The eye is one organ that demands utmost consideration of the physician during pregnancy because of the significant changes it suffers during pregnancy. Both anatomical and physiological variations are seen in the eye during pregnancy. Several pre-existing ophthalmic disorders are known to aggravate or ameliorate during pregnancy although the changes are usually transient.¹ What further adds to the clinician's distress is the fact that all ophthalmic medications which may be conveniently prescribed in a non-pregnant female cannot be used similarly in this case due to the associated foetal hazards during pregnancy and further during lactation.³ The variations that affect the eye during pregnancy may be classified as physiological and pathological.

The pathological disorders which occur during pregnancy may further be classified as:^{2,4}

1. Eye pathologies which existed before pregnancy and exacerbate in pregnancy.
2. Ophthalmic diseases diagnosed in pregnancy for the first time.
3. Associations of the eye with systemic diseases related to pregnancy.
4. Eye conditions occurring as a result of labour and delivery.

A thorough understanding of these changes is of paramount importance to diagnose and rectify these conditions at the warranted time and also to avoid over diagnosis and over treatment of the normal physiological conditions. This review aims to describe the changes that occur in the ophthalmic system during pregnancy and appropriate management of these conditions with due consideration to the pregnant state.

Physiological eye changes during pregnancy

Eyelids

Chloasma is the hyperpigmentation of the area around the eyes extending up to the cheeks (mask of pregnancy). It occurs as a result

of hormone induced increase in melanin content of the body due to increased number of melanocytes. The factors determining the extent of the disease are genetic predisposition, exposure to sunlight and type of skin.⁵ Ptosis has also been described during pregnancy and after normal delivery. It may be unilateral or bilateral. It occurs due to the effect of pregnancy related hormones on levator aponeurosis, does not require any treatment and shows self post-partum resolution.⁶ Intriguingly, there may be an over expansion of a pre-existing prolactinoma due to pregnancy induced enlargement of the pituitary gland which might result in ptosis.

Cornea

It has been observed on keratometry that the central corneal thickness increase during the second half of pregnancy, the probable cause of which is speculated to be water retention, and return to the pre-pregnancy values following delivery by eight weeks post-partum.^{7,8} It has been recorded that there is a decrease in the corneal sensitivity occurring during pregnancy which resolves by about 6 weeks post-partum.⁹ The increased corneal thickness as a result of corneal edema changes the refractive index of the cornea. For the same reason, contact lens users may find extreme difficulty in wearing them and also complain of blurred vision. These corneal changes are more pronounced in the last trimester of pregnancy.¹⁰ Pregnant women seeking prescription for glasses or contact lenses should be advised to delay it until after delivery. Pregnancy may be considered as a contraindication to laser refractive surgery which may be done only after attainment of stable refraction in the post-partum period.^{11,12}

Lens

Temporary accommodation loss due to alteration in the curvature of the crystalline lens is a common finding seen during pregnancy and lactation. The patient should be counselled about the fact that there may be subtle changes in her vision and that new glasses should not be prescribed during this period.¹³

Tear film

The lacrimal acinar cells may be disrupted resulting in reduced tear formation which in turn may lead to dry eye, infection, foreign body sensation and localised trauma.¹⁴ The mechanisms of dry eye during pregnancy include:

- a. Estrogen hormone of pregnancy causes decrease in the secretions from the lacrimal gland due to acinar cell death.¹⁵

- b. Immune mediated damage to lacrimal acinar cells, due to pregnancy hormones and factors e.g. prolactin, transforming growth factor beta 1 and epidermal growth factor.¹⁴
- c. Dehydration caused due to nausea and vomiting of pregnancy, more pronounced in the first trimester of pregnancy.¹⁴

Intra- ocular pressure (IOP)

A reduction in the IOP in pregnancy is noted by about 10% of the pre-pregnancy value. The IOP keeps on decreasing with the progression of pregnancy with the maximum drop being observed between 12 and 18 weeks. This reduction in IOP tends to remain the same even during postpartum period for several months.¹⁶ The most likely cause of this reduced IOP is the increase in the flow in the outflow tract including increased uveoscleral outflow due to hormonal changes mainly progesterone, decreased episcleral venous pressure and decreased pressure in the upper extremities.¹⁷ This hypotensive effect caused by increased outflow is mediated by a surge in the levels of estrogen, progesterone and relaxin in pregnancy.⁷ It has also been noted that the changes in the intraocular pressure are also dependent upon the number of fetuses.¹⁸ Henceforth it is quite evident that improvement in pre-existing glaucoma may be observed during pregnancy.

Pathological eye changes during pregnancy

Pre-eclampsia and Eclampsia

Pre-eclampsia may be defined as a multisystem syndrome of unknown cause comprising hypertension (140/90 mm Hg and above) and proteinuria, typically appears after 20 weeks of pregnancy, while eclampsia is defined as preeclampsia with seizures.¹⁹ 25% of patients with pre-eclampsia and 50% of patients with eclampsia have abnormalities affecting the visual system.²⁰ The ocular manifestations of pre-eclampsia include scotomas, blurred vision, photopsia, retinal edema, retinal detachment and blindness.²¹

The ocular manifestations in preeclampsia/eclampsia may result as a consequence of:²²

- a. Coexisting/preexisting systemic vascular disease.
- b. Hormonal changes in pregnancy.
- c. Damage to endothelium due to toxemia.
- d. Disturbance in autoregulatory system.
- e. Hypoperfusion ischemia and/or hyperperfusion/edema.

On retinal examination these women have findings similar to those of chronic hypertensive retinopathy such as hemorrhages, papilledema, and subretinal fluid accumulation. The condition is relevant for both ophthalmologist and gynecologist as the severity of pre-eclampsia correlates with the extent of retinal findings.^{13,19} Most of the ophthalmological findings resolve after delivery with resolution of pre-eclampsia.²³

HELLP Syndrome

HELLP syndrome is a sequelae of severe pre-eclampsia which is characterised by haemolysis(H), elevated liver enzymes(EL), low platelets(LP). There may be a wide variation in the ocular symptoms of these patients with HELLP syndrome ranging from mild diminution of vision to acute loss of vision. Retinal artery and vein occlusions, serous retinal detachments and Purtscher like retinopathy are the associated contributory factors which may also cause permanent damage. Cortical blindness may occur as a consequence

of neurological damage to the occipital lobe as a result of HELLP syndrome.²⁴

Diabetic Retinopathy (DR)

The prevalence of pre- conceptional diabetes mellitus in pregnant women has been noted to between 2-5 %.²⁵ Ophthalmic manifestations are observed in cases of pre-existing diabetes before pregnancy and very rarely in cases of true Gestational Diabetes Mellitus.²⁶ The most common ophthalmic condition to be modified by the pregnant state is diabetic retinopathy.⁹

The progression of DR in pregnancy depends on the following factors:²⁷

- i. Severity of DR in the pre-conceptional period (most significant).
- ii. The duration of diabetes mellitus.
- iii. Whether diabetes is controlled/ uncontrolled.
- iv. The pregnant state per se.
- v. Chronic/ pregnancy induced hypertension.

Women with diabetes who have minor or no proliferative retinopathy pre-conceptionally do not show progression of DR during pregnancy. However, deterioration of DR is seen in 55% of females with moderate or severe NPDR before pregnancy. It has been suggested that conception should be postponed till DR is stabilized. The first retinal examination should be scheduled in the first trimester for all pregnant women with diabetes mellitus and subsequent visits to be done according to the severity of the disease.²⁸ The American Academy of Ophthalmology states that one additional ophthalmological examination should be done before conception for baseline severity and examinations should be scheduled every 3 months throughout pregnancy.²⁹ High rates of spontaneous regression have been observed after delivery in women with DR. Laser treatment or vitrectomy for diabetes-related retinal changes can be considered during pregnancy.²⁵

Glaucoma

Glaucoma is optic nerve neuropathy typically occurring in patients above 40 years of age but younger population may be involved occasionally. It presents with visual field defects and changes in optic nerve head. Glaucoma may be treated through medical management or may require surgery (laser) in certain cases. Intraocular pressure (IOP) is the only modifiable risk factor in patients of glaucoma.³⁰ As mentioned in the article before, the IOP tends to decrease by 2-3 mm Hg during pregnancy physiologically under the influence of progesterone hormone. This ensues the added advantage of avoiding glaucoma drugs in pregnancy which may be challenging for the ophthalmologist.³¹ Most of the medications used for glaucoma belong to pregnancy category B or C and hence should be used restrictively. However, surgery for glaucoma such as trabeculectomy, shunt tube surgery, laser trabeculoplasty and cyclophotocoagulation may be beneficial for these patients and can be performed during pregnancy.³²

Ophthalmic manifestations during labour

Sheehan's Syndrome

Sheehan's syndrome may result in double vision, ophthalmoplegia, sudden loss of vision or visual field defects. It is also known as 'pituitary apoplexy'.³⁰ The etiology of this condition is the necrosis of the pituitary gland due to ischemia, which occurs as a consequence of hypovolemia as a result of severe post-partum haemorrhage.³³

Bitemporal superior quadrant visual field defects are noted. Ptosis, diplopia, mydriasis, and latero-inferior deviation of the globe occurs due to cavernous sinus compression. Horner's syndrome may also be observed if sympathetic nerve fibres are involved. Ophthalmoplegia may be resolved but recovery of vision is less likely.³⁴

Amniotic fluid embolism

Occlusion of retinal arterioles may occur by amniotic fluid embolus during labour, delivery or early post-partum period. It is a rare condition with a high mortality rate of 85%. It presents with acute onset breathlessness, convulsions and features of shock. The associated ophthalmological manifestation is blindness due to central renal artery occlusion (CRAO) which may often be overlooked due to the deteriorating clinical condition of the patient.³⁵

Conclusion

Pregnancy is a state of several pathological and physiological alterations with significant variations occurring in the ophthalmological system, which include both aggravated and induced disorders. It is of paramount importance that the treating clinician is aware of these manifestations and the clinical course that they are about to take during pregnancy. It should be advocated that a detailed ophthalmic examination is scheduled as early as possible. Ophthalmic drugs should be prescribed to pregnant women with great caution as the data regarding their safety in pregnancy is still sparse. Meticulous management and timely referral if needed is the need of the hour for maternal and foetal health.

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None.

Conflicts of interest

The authors declare that there are no conflicts of interest.

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