Review article

Ocular changes in pregnancy and the postpartum period

P H P De Silva[a], D C Perera[b], M J Gamage[c]

Background

Pregnancy is a time of significant change and adaptation in maternal health. It affects every system of the body, including the eye. While maternal ocular change is not often at the forefront of obstetric management, it is crucial to understand how the eye changes through pregnancy, as these changes can range from common conditions such as subtle shifts in refraction[1] to rare but devastating cases of vision loss[2].

Pregnancy can cause physiological and pathological changes in the eye. Physiologic change often gradually fades in the postpartum period. Pathological change can be further broken down into two categories. The first is a novel disease, night blindness, which occurred in 1-1.2% of pregnant patients in South Asia reported 35 years ago, in which one country participated was Sri Lanka[3]. The second type of pathological change is exacerbation of underlying conditions such as diabetes mellitus, a disease that has increased significantly in Sri Lanka over the last decade[4], which leads to progression in retinal disease. These categories of ocular change in pregnancy are discussed below and summarized in Table 1.

Physiologic ocular changes during pregnancy

Cornea

Certain hormonal changes in pregnancy, such as an increase in aldosterone, cause an increase in fluid retention[5] that affects the cornea. This causes a decrease in corneal sensitivity[6], an increase in corneal thickness, and an increase in curvature, which may impact refraction[2], especially later in the pregnancy. The thickened cornea will lead to a myopic shift, and corneal changes may lead to contact lens intolerance. Accordingly, refractive surgeries and prescription lenses should be delayed until several weeks post-partum. Also to note is that there is alteration of composition of the tear film.

The incidence of dry eye increases in pregnancy due to increased dehydration, use of antiemetics, increased immune reaction in lacrimal duct cells[1], and potentially due to changes in aquaporin expression[7] and elevated serum estrogen[8]. Topical eye drops for dry eye disease have not been associated with adverse neonatal outcomes and should be used for dry eye management. While the mechanism for pregnancy-related dry eye resolves post-partum, failing to treat dry eye in the pregnancy period may lead to corneal abrasions and have a lasting impact on the ocular surface.

Sri Lanka Journal of Obstetrics and Gynaecology 2023; **45:** 179-185

DOI: https://doi.org/10.4038/sljog.v45i4.8109

[a] *Consultant in Obstetrics and Gynecology, Colombo North Teaching Hospital, Sri Lanka.*

[b] *Pre-residency Medical Graduate, Robert Larner College of Medicine, University of Vermont, USA.*

[c] *Consultant Ophthalmologist, Colombo North Teaching Hospital, Sri Lanka.*

Correspondence: PHPdeS, e-mail: madiwelakotte@gmail.com

https://orcid.org/0000-0002-7899-4901

Received 10th December 2023

Accepted 31st December 2023

Table 1. Summary of ocular changes in pregnancy

Category of ocular change	Condition	Mechanism	Management	Outcomes
Physologic	Corneal change	Fluid retention increases corneal hydration and changes corneal curvature	Avoid refractive surgeries and lens prescriptions; contact lens intolerance may be heightened in this period	Resolves in postpartum period
	Decreased intraocular pressure	Decreased systemic resistance and increased aqueous outflow	Consider laser trabeculectomy for patients whose pressures are difficult to control even in the decreased intraocular pressure state	Resolves in postpartum period
	Melasma	Increased melanogenesis from hormonal changes	Fades, however topical treatment can be considered for persistant conditions	Resolves in postpartum period
	Ptosis	Hormonal change to and fluid penetrates levator aponeurosis	Conservative management	Resolves in postpartum period
	Vision changes	Lens curvature changes, weakening of accommodation reflex, and increased dry eye dehydrating the corneal surface	Dry eye changes are managed with topical drops. Suspicion for vitamin A deficiency which exacerbates vision changes should be investigated. Significant visual defects should be investigated.	Resolves in postpartum period
Novel Disease	Central serous retinopathy	Fluid buildup behind the retina with macular involvement	Primarily conservative	Resolves in postpartum period, increased risk in same eye in subsequent pregnancies
	Preeclampsia/ eclampsia ocular changes	End organ hypertensive damage/ PRES	Aggressive hypertensive management	Resolves in postpartum period, however some visual field defects may persist through the breastfeeding period
	Vaso-occlusive events	Hypercoagulability in pregnancy increases occlusion risk	Optimization of underlying underlying disorders such as DIC management, corticosteroid treatment for angiopathy and acetazolamide treatment. Acetazolomide is not used in pregnancy though.	Commonly resolves in postpartum period, however permanent cases have been reported

(Continued)

Category of ocular change	Condition	Mechanism	Management	Outcomes
Exacerbation of underlying disease	Diabetic retinopathy	Endothelial cell damage and increased VEGF production in pregnancy	Patients with previous diagnosis of diabetes should have an ophthalmologist appointment before or early in pregnancy. If no retinopathy is detected in first trimester review should be about 28th week. Severe retinal disease may be treated with laser therapy to prevent further progression as appropriate.	May resolves in postpartum period, however risk for progression persists one year into the postpartum period
	Ocular masses	Increased vascularization	Primarily excision of vision compromising masses such as impinging meningiomas	Mass dependent
	Grave's disease	Increased thyroid activity	Multidisciplinary hyperthyroidism treatment, PTU in the first trimester	Commonly resolves in third trimester
	Idiopathic intracranial hypertension	Increased weight	Weight management	Commonly resolves with weight management
	Toxoplasmosis	Latent reactivation	1st trimester – Spiramycin 2nd trimester on pyrimethamine + sulfadiazine or clindamycin+oral steroids OR clindamycin/steroid intravitreal injection	Commonly resolves with treatment
	Scleritis	Possibly hormonal changes	Oral and/or sub-tenon steroid treatment	Commonly resolves with treatment
	Uveitis	Latent reactivation of infction or hormonal changes	Autoimmune – Local eyedrops, immunosuppressive medications. Infectious – antibiotics, steroids	Autoimmune – improve in 2nd/ 3rd trimesters Infectious – resolve with treatment

Intraocular pressure

Physiologic factors in pregnancy, such as increased aqueous outflow and decreased systemic vascular resistance, lead to lower episcleral venous pressure, resulting in an overall decrease in intraocular pressure by 2-3 mmHg[10]. Patients with pre-existing ocular hypertension often have an improvement in intraocular pressures during this time; however, because of the teratogenicity of some topical glaucoma medication, laser trabeculoplasty may be considered to control intractable high pressures and progression in glaucoma patients planning to become pregnant.

Skin and lid

Hyperpigmentation of skin around the eyes (melasma/ chloasma) is a common change in pregnancy that results from increased melanogenesis and melanocytosis induced by increased serum estrogen and progesterone[11].

Pregnancy can cause unilateral ptosis due to hormonal weakening and water molecules penetrating the levator aponeurosis[12]. Lid drooping often resolves postpartum.

Vision changes

In pregnancy, altered corneal curvature and refractive power, increased thickness and refractive index of the lens, and changes in tear film composition contribute to vision changes in pregnancy.

An influx of water into the lens lead and a weakening of accommodation in the pregnant patient cause visual changes. This may last through the breast-feeding period[13].

While the pituitary gland increases physiologically in pregnancy, bitemporal hemianopsia should be investigated for abnormal relationships between the gland and the optic chiasm and possible tumor[13].

The increased incidence of dry eye may cause difficulty in seeing, especially in the daytime. These vision defects are further exacerbated by vitamin A deficiency.

Novel ocular disease in pregnancy

Central serous retinopathy

Pregnancy is a risk factor for central serous chorio-retinopathy, a build-up of sub-retinal collection of serous fluid leading to retinal detachment. Macular involvement leads to visual defects such as central scotoma, image distortion, microtosia and meta-morphosia[13]. Though 90% of cases are unilateral, bilateral cases have been reported, such as one case of a 36-year-old patient in Colombo[15]. The condition predominantly resolves in the postpartum period; however, risk of recurrence is increased in the same eye during subsequent pregnancies[13].

Complications of preeclampsia/ eclampsia

Preeclampsia/ eclampsia are disorders defined by a gestational hypertensive state that may cause damage to end organs, including the eyes. One in three patients with pre-eclampsia/ eclampsia experience ocular complications such as blurry or double vision[1]. Additionally, the increasing severity of gestational hypertension is linked to increased severity of retinopathy. Ocular fundus exams thus give significant insight into predicting fetal mortality[13]. Preeclampsia/ eclampsia also increases the risk of retinal haemorrhage and detachment. This risk increases multifold in patients with HELLP syndrome. Accelerated hypertension is considered a cause of retinopathy and optic neuropathy.

Anterior ischemic optic neuropathy is thought to be due to accelerated hypertension leading to disturbance of the blood supply to the optic nerve.

Posterior reversible encephalopathy syndrome (PRES) is a feared complication that affects preeclamptic/eclamptic patients and may lead to complete cortical blindness (anosognosia) resulting from cerebral vasospasm or vasogenic oedema. It can last from four hours to as long as eight days[2]. Symptoms of headache, altered mental status, and seizures commonly present with PRES. Neuroimaging may demonstrate bilateral vasogenic oedema in subcortical white matter, but PRES is a diagnosis of exclusion even without radiologic evidence. The condition is primarily reversible: a case published in the *Sri Lankan Journal of Anesthesiology* details one 18-year-old patient recovering in 48 hours after prompt recognition and aggressive blood-pressure-lowering treatment[16]. However, some visual field defects may persist for several months into the postpartum period.

Vaso-occlusive events

Pregnancy is a hypercoagulable state that increases the risk for vaso-occlusive events in the eye.

Central retinal artery or, more rarely, vein occlusions cause global diminishing of vision and branch retinal artery occlusions cause visual field defects hnancy[2]. DIC increases the risk of these occlusions. Ocular symptoms are then managed by optimising DIC treatment.

Purtscher, like retinopathy traumatic retinal angiopathy, correlates with complicated labour courses. Though commonly reversible in the postpartum period, there is a possibility of permanent bilateral blindness despite corticoid steroid and acetazolamide treatment[17].

Exacerbation of underlying disease

Diabetic retinopathy

According to an SLDCS study diabetes has increased exponentially in Sri Lanka over the past 20 years, with 31.3% of the diabetic **clinic** attendee's population presenting with diabetic retinopathy in 2014[18].

Gestational diabetes carries little risk of diabetic retinopathy. However, up to 50% of pregestational diabetic patients who present with moderately severe non-proliferative diabetic retinopathy (NPDR) or retinopathy without neovascularisation saw progression to more severe NPDR and some to proliferative diabetic retinopathy (PDR)[1]. Progression of diabetic retinopathy in pregnancy is likely due to increased capillary blood flow, causing endothelial damage to retinal capillaries and progesterone-stimulating VEGF. Pre-pregnancy laser therapy could be considered for patients with severe NPDR as it significantly decreases the chance of retinopathy progression[1].

Ocular masses

During pregnancy, certain tumours have the propensity to vascularise and grow. Pituitary masses may grow larger and impinge on the optic chiasm, causing visual field defects. Patients with a history of uveal melanoma should be closely monitored for reactivation. Intracranial meningiomas, which typically follow a slow growth pattern with gradual, if any, visual symptoms, have been shown to follow a rapid course with dramatic loss of visual acuity in pregnant patients[19]. It has been noted that some orbital haemangiomas grow during pregnancies. Treatment of these masses is primarily through surgical management.

Grave's disease

Grave's disease is a major cause of hyperthyroidism in pregnancy that is exacerbated in the first trimester and the postpartum period[20]. The ocular symptoms of Grave's disease, such as exophthalmos and lid lag, follow the same exacerbation course. Patients may be treated with propylthiouracil (PTU) in the first trimester.

Idiopathic intracranial hypertension

Ocular symptoms of idiopathic intracranial hypertension may increase in pregnancy, especially with previous diagnoses of obesity. Papilloedema can be seen on the fundal exam, and symptoms range from blurry to double vision. Management is primarily through weight regulation[2].

Toxoplasmosis

Pregnant patients may experience reactivation of latent ocular toxoplasmosis chorioretinitis and present with eye pain, hazy vision, and photophobia. Reactivation does not endanger the fetus.

Scleritis

While the usual treatment of posterior scleritis is oral steroids, sub-Tenon steroid injection can be considered in pregnancy as the condition can worsen or recur[21].

Uveitis

Beneath the sclera lies the uvea, the middle layer of the eye containing the iris, ciliary body, and choroid. Inflammation of the uvea results in the uncommon condition of uveitis. Uveitis can result from infectious or autoimmune origins. Due to the immune-tolerant state of pregnancy, autoimmune conditions of uveitis may see improvement, especially after the second trimester[22]. Autoimmune uveitis flares, which may be prominent in the first trimester or after delivery, can be treated with local eyedrops or immunosuppressive medications[23]. Infectious uveitis, such as from reactivation of latent toxoplasmosis, may happen and can be managed by treating the underlying infection.

Conclusions

Ocular symptoms in pregnancy are common, and many of them are fully expected with the changing physiology of the body. These physiological changes are a contraindication for refractive surgery, and patients should wait until the postpartum period to have prescription lens appointments. Retinal detachments and blinding conditions can occur and are frequently associated with preeclampsia/ eclampsia. While some pre-existing conditions that affect the eyes may improve with pregnancy due to a relative immune-suppressive state[20], such as the occurrence of multiple sclerosis flare-ups, uveitis, and ocular hypertension, pathologies such as diabetic retinopathy are prone to progression. Most ocular conditions that occur in pregnancy will regress in the late trimester or the postpartum period; however, recognition of these conditions and understanding of optimal management will improve patient quality of life and may even prevent cases of permanent vision loss.

Acknowledgements and disclosures

Funding

No funding or grant support.

Conflicts of interest

None.

Acknowledgements

None.

Financial disclosures

None.

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