

Eye changes during pregnancy

Essay

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I dedicate my work to

My Family

&

The great loves of my life...

My Husband

My Son Khaled

& My coming Son

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Abstract

The eye changes during pregnancy are numerous. Ophthalmologists as well as obstetricians should be aware of these changes to be able to identify them, differentiate between them and then treat them accordingly. These changes are basically divided into physiological, pathological changes and changes in preexisting conditions. Physiological changes are these changes that can occur normally to any pregnant women and require no treatment. One of the important changes that should be kept in mind is the change in the refractive state which is usually in the form of a myopic shift. An ophthalmologist should therefore avoid doing any refractive eye surgery during pregnancy or shortly after delivery until the refractive state is stable. In addition, contact lens prescription should also be avoided due to the same reason. Contact lens intolerance was also documented to happen. Other physiological changes include changes in the corneal and lens diameter, pregnancy related night blindness and changes in the intraocular pressure. Most of these changes are due to affection of the eye by pregnancy hormones and are usually reversible.

Key Words:

- Physiological eye changes during pregnancy.
- Changes in pre-existing conditions.
- Pathological eye changes during pregnancy.
- Drugs in ophthalmic use and their effects on pregnancy.

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List of abbreviations

ACE	Angiotensin converting enzyme
BIH	Benign intracranial hypertension
CNV	Choroidal neovascular membrane
CT	Computed tomography
DIC	Disseminated intravascular coagulation
DIEP	Diabetes in Early Pregnancy Study
DLE	Discoid lupus erythematosus
EIU	Experimental induced uveitis
ELISA	Enzyme linked immunosorbant assay
HCQ	Hydroxychloroquine
HELPP	Hemolysis, elevated liver enzymes and low platelets
ICG	Indocyanine green
IL	Interleukin
IOP	Intraocular pressure
IUSG	International Uveitis Study Group
LASEK	Laser subepithelial keratectomy
LASIK	Laser in situ keratomileusis
MRI	Magnetic resonance imaging
MS	Mean threshold sensitivity
MS	Multiple sclerosis
NPDR	Non proliferative diabetic retinopathy
OAG	Open angle glaucoma
OCT	Optical coherence tomography
PIH	Pregnancy-induced hypertension
POHS	Presumed ocular histoplasmosis syndrome
PRK	Photorefractive keratectomy
PRNB	Pregnancy-related night-blindness
RPE	Retinal pigment epithelium
SLE	Systemic lupus erythematosus
SUN	Standardization of Uveitis Nomenclature
TGF	Tumour Growth Factor
TTP	Thrombotic thrombocytopenic purpura
VTE	Venous thromboembolism
VKH	Vogt-Koyanagi-Harada

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INTRODUCTION

Pregnancy is a physiological condition which is often associated with ocular changes. These changes are most often transient in nature, though occasionally they become permanent. Pregnancy can be associated with development of new conditions, or can exacerbate pre-existing conditions. Thus, the ocular effects of pregnancy may be divided into physiologic changes, pathologic conditions or modifications of pre-existing conditions. Pathologic conditions include entities such as pre-eclampsia and eclampsia, along with conditions that are seen with increased frequency during pregnancy such as central serous retinopathy. The most significant modified pre-existing condition is diabetes mellitus. The effects of pregnancy on the eye, as well as the use of ophthalmic medications in pregnancy will be reviewed and displayed in this work (*Sheth and Mieler, 2005*).

Pathological conditions are several, for example, serous retinal detachments and blindness occur more frequently during preeclampsia and often subside postpartum. As for the changes that may involve conditions already present before gestation, the most important condition would be diabetes. Pregnant women are at increased risk for the progression of preexisting diabetic retinopathy, and therefore diabetic women should be informed to see an ophthalmologist before pregnancy or early in the first trimester (*Dinn et al., 2003*).

Diabetic eye disease may develop for the first time during pregnancy, and visual loss at this stage has serious implications for both the patient and her family. In the past, the prognosis for pregnancy in diabetic women with

microvascular disease was so poor that many physicians advised avoidance or termination of pregnancy (*Best and Chakravarthy, 1997*).

A decreased tolerance to contact lenses also is common during pregnancy; therefore, it is advisable to fit contact lenses postpartum. Furthermore, pregnancy is associated with a decreased intraocular pressure in healthy eyes, and the effects of glaucoma medications on the fetus and breast-fed infant are largely unknown (*Dinn et al., 2003*).

It is well established that complications of pregnancy, e.g. pre-eclampsia, eclampsia and disseminated intravascular coagulation may cause serous retinal detachment (*Burke et al., 1989*). However, in the vast literature concerning retinal diseases there is very little written about the management of pregnant woman who have high-risk retinal pathology predisposing them to rhegmatogenous retinal detachment. Over the years, general practitioners, obstetricians and ophthalmologists have encouraged women with high myopia, known retinal degeneration problems, or previous retinal detachment to deliver by cesarean section or instrumental delivery (vacuum or forceps), in order not to "put pressure" on the eyes during a normal vaginal delivery. This will be further discussed, as some authors think otherwise (*Neri et al., 1985*).

As for refractive changes during pregnancy, hormones produced during pregnancy and lactation can cause most women's refractive state to fluctuate dramatically. In general, unless the refractive change is quite significant, ophthalmologists usually recommend waiting until a few weeks post-partum before a prescription for glasses is re-evaluated. It may be quite tempting for women with a refractive error to consider refractive surgery in this era. It is important for clinicians to have up-to-date knowledge about the refractive

changes in the eye during pregnancy as these may have implications in the management (*Sharma et al., 2006*).

Pregnancy and the postpartum period are associated with the activity of autoimmune diseases including uveitis. Although the exact mechanism is unknown, hormones are reported to alter inflammatory cytokines and influence disease activity. Many authors studied ocular inflammation, female hormones, and serum cytokine levels during and after pregnancy (*Chan et al., 2004*).

A review of some vascular changes will be discussed such as the decrease in retinal venous diameter during the third trimester of pregnancy in both diabetic and non diabetic mothers. This decrease is significantly larger in diabetic than in non diabetic mothers (*Shocket et al., 1999*).

Recent reports have contributed to our understanding of the pathophysiology of diabetic retinopathy and cortical blindness associated with preeclampsia, the impact of pregnancy on the course of inflammatory eye disease, and the use of optical coherence tomography in following central serous chorioretinopathy in pregnant women (*Schultz et al., 2005*).

Unfortunately, the changes during pregnancy are difficult to observe and quantify for a number of reasons. Risks to the foetus preclude any invasive testing of the mother (including tests that might be considered non invasive in a non pregnant patient) unless it is clearly indicated for maternal health (*Sunness, 1998*).

Aim of Work

The aim of this essay is to review and to improve the understanding of the pathophysiology of ocular disease in pregnancy and the impact of pregnancy on the course of preexisting ocular disease .This will offer a better opportunity for meaningful counseling of women who are pregnant or planning to become pregnant.

Physiological Changes in Pregnancy

A- Changes in the cornea and lens:

Several physiological changes occur normally during pregnancy and most of them are reversible postpartum while some of these changes clear after stoppage of breastfeeding. Physiological changes are encountered by most pregnant women and although they may be annoying, they resolve without any consequences and should therefore be known by the ophthalmologist as not to cause any confusion with serious pathological changes that require other forms of management. Some of these changes involve the cornea and lens giving rise to various symptoms and signs. To start with, corneal sensitivity has been found to decrease in most pregnant women, with most changes occurring in the third trimester and are reversible postpartum. One potential mechanism may be related to the slight increase in corneal thickness that may develop from corneal edema as a part of the generalized state of salt and water retention that is present during pregnancy. An increase in corneal curvature and steepening also may occur. These changes have been reported to develop even in the postpartum period during breastfeeding. However, the increase in corneal curvature is reversible upon cessation of breastfeeding (*Somani et al., 2005*).

Corneal thickness has also been found to increase during pregnancy, a condition which resolves a short time after delivery. The amount of increase in thickness varies from 1 to 16 microns. A possible cause of increased corneal thickness is fluid retention related to pregnancy (*Ziai et al., 1994*).

The corneal curvature is also found to increase by an average of 1 dioptre in the second half of pregnancy, resolving post-partum or after cessation of breast feeding (*Park et al., 1992*).

Another corneal sign which was observed early in pregnancy is the development of new Krukenberg spindles. The mechanism presumably is related to hormonal changes (e.g., low progesterone levels). However, by the third trimester, an increase in progesterone and aqueous outflow often result in decreased or absence of Krukenberg spindles (*Somani et al., 2005*).

Regarding the crystalline lens it was found that the curvature of the crystalline lens increases which causes a myopic shift during pregnancy and breastfeeding (*Duane, 2001*).

B-Refractive changes and pregnancy:

There is no definitive consensus in the published literature on the refractive changes in pregnancy, although proven physiological changes suggest that refractive changes do occur in pregnancy. In a study done by *Pizzarello in 2003*, 14% of the 83 women in this study showed variable refractive changes that will be discussed. On the other hand, different studies have found that mean visual acuity, corneal curvature and refraction do not change significantly during pregnancy (*Akar et al 2005*).

Myopia and pregnancy

Myopia is a very common ocular problem, affecting perhaps one billion people worldwide. Myopia is classified as mild or low (< 2 dioptre), moderate or intermediate (2–6 dioptre) and severe or high (> 6 dioptre). Myopia may increase during pregnancy. *Pizzarello in 2003* studied 83 pregnant women to determine the causes of visual changes during pregnancy and post-partum. Twelve women complained of visual changes and were found to have experienced a myopic shift during pregnancy, in the range of 0.87 ± 0.3 diopters in the right eye and 0.98 ± 0.3 diopters in the left eye. Post partum, all subjects returned to near pre-pregnancy levels of myopia. The causes of this myopic shift are not readily evident. Women in the study had no signs of cataract on examination. Blood sugar measurements were available for each woman during the pregnancy. Only one patient developed gestational diabetes. Pupillary responses were uniformly normal and did not show any sign of accommodation spasm. In fact every investigation performed failed to reveal the etiology for the myopic shift seen in the study. This is an area for further investigation (*Pizzarello, 2003*).

Myopia and the effect of labour

No cases have been reported in the literature that can connect retinal detachment and childbirth in myopic women. *Neri et al in 1985* undertook a study to test whether this assumption was true. They collected obstetric data from 50 women with myopia from 4.5 to 15 dioptres who were admitted to the labour ward. Fundus examination was performed in all of them before and after delivery. Various types of retinal degeneration and retinal breaks were observed in most of them at their arrival but none had a retinal tear or