



## Should I Get LASIK If I'm Breastfeeding?

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**Abstract:** Changes in keratometric values and refraction can occur during pregnancy. For this reason, changing a patient's refractive prescription or undergoing corneal refractive surgery is not recommended during pregnancy. However, the extent to which these corneal changes persist during lactation is not as well reported. Pregnancy and lactation lead to hormonal changes that affect the corneal structure. LASIK, or other types of refractive surgery, is not recommended until all of the following conditions are met: cessation of lactation, the return of regular menses, and a return to pre-pregnancy refraction. Additionally, patients should be cautioned that refractive regression may occur if they become pregnant within 1 year of LASIK.

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The female body undergoes many drastic changes during pregnancy. While some of these changes are apparent, others are harder to detect—for both observers and patients. Corneal changes fall into the latter category. While LASIK during pregnancy is contraindicated [1], our purpose is to discuss corneal changes that start in pregnancy and persist through lactation and to provide recommendations for performing corneal refractive surgery in the post-partum period.

While hormone levels in pregnancy can vary based on the individual, there is a significant increase in progesterone and several forms of estrogen (including estradiol and estrone) [2, 3]. Estrogen and progesterone levels return to pre-pregnancy values within a few days after delivery [3]. This decline in estrogen and progesterone levels disinhibits prolactin so that lactation occurs shortly after [4]. Oxytocin also regulates the let-down of milk [5]. If milk removal is not sufficient, pro-lactation hormone levels decline due to the release of an inhibitor [6]. If a woman does not breastfeed after delivery, it usually takes around 6 weeks for menses to return [7]; however, if a woman is

breastfeeding, she will not see a return of menses for 6–9 months, on average [8, 9].

The human cornea has sex-hormone receptors to estrogen, progesterone, and androgen [10]. The activity of these receptors is thought to drive hormonally mediated corneal changes during times of hormonal fluctuation, from menstruation [11] to pregnancy to menopause [12].

Corneal thickness changes during pregnancy [13]. This thickening effect is postulated to be secondary to water retention [13]. However, there is conflicting evidence, with Kilavuzoglu et al. [12] reporting no significant change in corneal thickness during pregnancy or lactation. There is evidence that a change in corneal thickness occurs during the third trimester when estrogen and progesterone levels are very high, but that this change does not persist in the post-partum period [14].

Corneal curvature is another parameter that changes during pregnancy [15]. One study noted that steepening of the corneal front steep  $K$  value was the only significant value that changed during pregnancy [16]. Similar to corneal thickness, this change in  $K$  value was not consistent in all studies [12]. Changes in curvature seem to persist throughout lactation but are less marked than during pregnancy [15]. This difference suggests that prolactin may play a role in corneal morphologic changes, although no prolactin receptor has yet been found in the human cornea.

These topographic changes may or may not result in refractive changes. Not all pregnant or lactating women notice a change in their vision [17, 18]. In women who did complain of visual changes during pregnancy, a myopic shift was documented [17]. Most patients had improvement of their myopic shift by 15 weeks post-partum. Complete resolution occurred in only 8% of participants through the course of the study (5–24 weeks post-partum). It was not reported whether the patients were breastfeeding during the post-partum period. A similar study reported myopic shifts with a complete return to pre-pregnancy acuity during the postpartum period in the majority of patients [19]; there was also no mention of whether the

patients were breastfeeding during the postpartum period of observation.

Decreased tear production is another change associated with pregnancy [20]. While the exact mechanism of this effect is not entirely understood, animal models show changes to ion transporters in the lacrimal ducts during pregnancy [21]. In addition, certain forms of estrogen increase pro-inflammatory cytokine production in human corneal epithelial cells [22]. A combination of these factors most likely leads to an increased incidence of dry eye in pregnancy [20]. Because dry eye disease is a common side effect of LASIK [23], tear quality and production should be adequate before considering LASIK during the post-partum period. Furthermore, a patient's pregnancy after a LASIK procedure may further reduce tear production. If a patient who had LASIK becomes pregnant and complains of dry eye symptom, there should be a low threshold for initiating treatment (the use of punctal plugs).

While there is a limited amount of data on LASIK outcomes in lactating patients, there have been several studies on photorefractive keratectomy (PRK) during pregnancy. One study found refractive changes in patients who became pregnant shortly after PRK [24], and another reported a case with similar results, where refraction returned to baseline after a spontaneous abortion [25]. However, another study reported satisfactory refractive results in patients who underwent PRK during pregnancy [26]. A study reported visual changes in pregnant patients who either had LASIK previously or had no history of refractive surgery, and found that the magnitude of visual change during pregnancy was inversely proportional to the degree of refraction corrected by LASIK [27]. However, the group who had LASIK prior to pregnancy showed more significant changes in their refraction than the women who did not undergo refractive surgery. This change in refraction among participants who had LASIK could be related to the loss of estrogen receptors that is directly proportional to the area of corneal resurfacing. There have also been reports of keratectasia in pregnant patients who had previously undergone LASIK [28, 29]. Although this is a rare finding, Hafezi et al. [28] suggested

that LASIK and pregnancy could trigger keratectasia in predisposed patients and that increased estrogen could reduce the biomechanical stability of corneal stroma.

In summary, changes in corneal parameters and refraction are relatively well described during pregnancy, but the degree of persistence of these effects during lactation is less evident. We do not recommend LASIK for lactating women. Although menstruation may resume while a patient is still lactating, we do not recommend using the return of a baseline menstrual cycle as an adequate marker for deciding that LASIK may be performed. Until the effects of prolactin on the cornea are better established, we recommend waiting for complete cessation of lactation before LASIK is performed. Also, evidence that refraction has returned to pre-pregnancy values is essential [30]. While it is clear that pregnancy is a contraindication to LASIK [1], we suggest that during lactation, the risks of LASIK outweigh the benefits. We also recommend informing patients who have recently undergone LASIK that pregnancy within a year after the procedure could result in an increased risk of refractive regression [30].

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