

2010-2-25 3:12:35

**REFRACTIVE
SURGERY****Estrogen's impact on the cornea**

Text

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Corneal collagen crosslinking (CCL) with riboflavin and ultraviolet-A has been shown to stop and sometimes partially reverse LASIK-induced keratectasia. But a new case study suggests pregnancy could limit the effectiveness of CCL, as well as exacerbate corneal instability. "Changes in the estrogen level during pregnancy might represent a previously unrecognized risk factor for the induction of keratectasia after LASIK surgery," wrote lead study author Farhad Hafezi, M.D., Ph.D., Institute for Refractive and Ophthalmic Surgery, Zurich, Switzerland. "To our knowledge, this is the first case to demonstrate that CCL may not be able to stabilize iatrogenic keratectasia in borderline cases."

Clearly, more research in this area needs to be done than the analysis of a single case, which was published in the July 2008 issue of the Journal of Cataract & Refractive Surgery.

The study nonetheless provides interesting insights about potentially new factors that could impact cutting-edge keratectasia therapy.

**New pregnancy complications?**

The case involved a 33-year-old woman who had LASIK surgery for myopia in Mexico in 2000. The surgery was uncomplicated, but Dr. Hafezi noted there was no information available about the flap creation process, including the estimated flap thickness and pre-op corneal thickness. She was stable for some time, but then began her first pregnancy in January 2003.

"In the seventh gestational month (July 2003), she noted a significant decrease in visual acuity in the right eye, coupled with glare and halos under mesopic conditions," Dr. Hafezi reported.

Although she did not see an ophthalmologist at that time, iatrogenic keratectasia was diagnosed in late 2004.

"During the following 4 months (January to April 2005), corneal topographical analyses revealed distinct bilateral progression of keratectasia," Dr. Hafezi reported. "Corneal collagen crosslinking was performed in both eyes and during the following 2 years, keratectasia not only remained stable but also regressed, as demonstrated by preoperative and postoperative corneal topographies and maximum K-readings and keratoconus indices."

But the stabilization wouldn't last. "In January 2007, the patient began her second pregnancy and in the sixth gestational month (June 2007), she noted a sudden deterioration of vision in the right eye," Dr. Hafezi reported. "Corneal topographies showed a progression of keratectasia in the right eye until the end of the second pregnancy. Maximum K-readings

reached levels similar to those before CCL." Meanwhile, the left eye remained stable.

It's true that according to previous research, the most significant risk factor for iatrogenic keratectasia is pre-op undetected corneal abnormalities, Dr. Hafezi noted.

But there's also "growing evidence that changes in estrogen levels may play a role in LASIK-induced keratectasia. Estrogen receptors have been identified in the cornea, and exposure to estrogen reduced the biomechanical stability of the cornea in an experimental study," Dr. Hafezi noted.

Could poor CCL itself have led to the additional eventual progression of keratectasia? Probably not.

"For several years following the first CCL treatment, the patient's topographies showed stabilization of the keratectasia," Dr. Hafezi reported. "A poor crosslinking effect is therefore highly unlikely." What about the left eye—why didn't it also progress with pregnancy? "A possible explanation is that the residual stromal bed thickness was slightly greater than in the right eye, which developed keratectasia," Dr. Hafezi concluded. "In such borderline cases, minimal biomechanical differences, along with pregnancy-induced changes in estrogen levels, might determine whether a cornea develops keratectasia."

Pregnancy could cause problems with ectasia, said Ruben Lim-Bon-Siong, M.D., Allied Ophthalmic Consultants, Manila, Philippines. After all, the contraindications for corneal LASIK include pregnancy.

"We always wait six months after the termination of breast feeding or pregnancy" to perform LASIK, Dr. Lim-Bon-Siong said. "The hormones of pregnant women affect the integrity of the cornea."

The hormonal balance could affect the curvature and hydration of the cornea, Dr. Lim-Bon-Siong said. The water level in the cornea also could change during pregnancy.

Nonetheless, it's still unclear how pregnancy specifically could relate to ectasia, he said.

Editors' note: Dr. Hafezi has no financial interests related to this study. Dr. Lim-Bon-Siong has no financial interests related to his comments.

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What you should know about pregnancy and ectasia

- Pregnancy after LASIK could exacerbate corneal instability. "Changes in the estrogen level during pregnancy might represent a previously unrecognized risk factor for the induction of keratectasia after LASIK surgery," according to Dr. Hafezi.
- Pregnancy could limit the effectiveness of corneal collagen crosslinking (CCL). In a recent case study, CCL helped after a patient was diagnosed with keratectasia following pregnancy 2 to 3 years after LASIK. But during a second pregnancy, keratectasia progressed.
- Estrogen level changes could be involved in LASIK-induced keratectasia. There is evidence that there are estrogen receptors in the cornea.

Source: Farhad Hafezi, M.D., Ph.D.