



## REFRACTIVE SURGERY

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# Should bilateral LASIK be performed sequentially or simultaneously?

**Sequential surgery allows for predictability while simultaneous offers a lower rate of re-treatments.**

Both sequential and simultaneous bilateral laser in situ keratomileusis (LASIK) surgeries have their pros and cons. Arguments relating to the timing of bilateral LASIK have induced debate. Same-day surgeries can be more convenient to both the patient and the surgeon. Other practitioners prefer waiting for a time before treatment of the second eye to avoid bilateral complications. According to a study conducted by Peter K. Chiang, MD, and Peter S. Hersh, MD, which compared the predictability between eyes after bilateral LASIK, the theoretical advantages of sequential bilateral LASIK include increased predictability for the second eye. This study analyzed the correlation of refractive predictability between fellow eyes of individual patients and then evaluated the theoretical effect of using the first eye result to plan treatment of the second eye. Dr. Chiang and Dr. Hersh suggest that if using the surgical results for the first eye can improve refractive results in the fellow eye, then performing LASIK procedures sequentially rather than simultaneously may be potentially beneficial to the patient. Additionally, sequential surgery may eliminate the risks of serious complications occurring bilaterally.

A study by Howard V. Gimbel, MD, MPH, et al, argues that simultaneous bilateral LASIK is as safe and effective as sequential. Dr. Gimbel claims the refractive and visual outcomes are similar between simultaneous and sequential eyes in terms of safety and refractive and visual outcomes, and there is a lower rate of re-treatment in the simultaneous group.

### The predictability theory

Dr. Chiang and Dr. Hersh's study suggests that looking at individual between-eye predictability does demonstrate an association of refractive predictability between eyes after bilateral LASIK. Additionally, the study's result suggests a theoretical benefit to sequential procedures. The physicians concluded that a patient's second eye would be closer to emmetropia if the result from the first eye is used in its planned correction. Patients who might be refractive outliers postoperatively could be saved from substantial bilateral ametropias since the second eye surgery could be adapted based on the first eye's outcomes to give a result nearer to emmetropia. Thus, re-treatments may be reduced in some patients, particularly if the second, in theory more precise, procedure is performed on the dominant eye.

A negative aspect of this study with regard to utilizing the planned attempted corrections suggested is the tendency toward overcorrecting in some patients. This is due to the aggressive nature of some proposed corrections that were based on first eye undercorrections.

Dr. Chiang and Dr. Hersh suggest that when performing the proposed attempted correction, the timing of the second procedure may be adequate at 1 week. The authors found no advantage to waiting longer. They conclude that sequential bilateral LASIK performed 1 week apart has the potential for better outcomes than with same-day bilateral procedures. The average theoretical refractive improvement in the second eye was about 0.5 D. However, this suggests that further study is necessary to assess the actual clinical significance of these findings.

The single-center case series involved one surgeon and 196 eyes of 98 patients. All patients received sequential bilateral LASIK, with a mean 11.6 days time period between procedures.

### Simultaneous versus sequential

According to Dr. Gimbel's retrospective review of 2,142 consecutive cases, the refractive and visual results for simultaneous and sequential are similar in safety and refractive and visual results. The predictability theory supported by Dr. Chiang and Dr. Hersh's study was not substantiated by Dr. Gimbel's data. Dr. Gimbel did not gain increased predictability in the second eye of sequential cases, probably because these were done as close as 4 days apart.

The re-treatment rate in sequential eyes was slightly higher, but not statistically significant, than in simultaneous cases.

Although sequential surgery may prevent increased risk of complications, Dr. Gimbel had one patient in the series of sequential bilateral LASIK that had shifted flaps in eyes operated 1-month apart and required suturing. There was no loss of best corrected visual acuity (BCVA) in either eye at the latest follow-up period. However, in planned simultaneous bilateral LASIK surgery, it is unlikely that serious intraoperative complications would occur bilaterally, because if a complication occurred on the first eye, it is inadvisable that surgery would be carried out on the second eye. According to the study, the only time the second eye would be operated on after the first eye sustained complications is if there was successful completion of LASIK surgery with laser ablation and with no anticipated loss of BCVA.

Those patients with a thin stromal flap, for example, would require that the stromal bed show no irregularities. In instances such as free cap, this would mean that the cap could be replaced satisfactorily after laser ablation.

With insufficient suction, the surgeon should consider utilizing a different microkeratome or smaller suction ring or make another attempt at a later date when conjunctival edema disappears, using a small lateral canthotomy if exposure was the fundamental cause for poor suction.

In complete passes or buttonholes where LASIK is unable to be performed successfully at that time, the fellow eye should be done later when the BCVA in the first eye is recovered.

Epithelial shift can generally be managed relatively easily; however, it should always be at the discretion of the surgeon whether to proceed with the fellow eye where there are significant shifts.

Dr. Gimbel argues the theory that sequential surgery may eliminate risks of bilateral infection. This was not substantiated by the study, which did not find that the use of the same equipment blade without interval sterilization resulted in any infectious complications in fellow eyes after bilateral simultaneous LASIK surgery.

According to Dr. Gimbel, the disadvantages of sequential bilateral LASIK include less convenience to the patient, and the two surgeries may vary in surgical environment and in the patient's physiology. Dr. Gimbel mentioned, although not statistically significant, that the second eyes in the sequential group had slightly more hyperopia. Additionally, anisometropia is a significant disadvantage in sequential surgery, and contact lenses may be required between surgeries.

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