

Surgical timing in combined ICRS and CXL for keratoconus

Ali Dal

Department of Ophthalmology, Cornea Unit, Tayfur Ata Sökmen Faculty of Medicine Hospital, Hatay Mustafa Kemal University, Hatay 31060, Türkiye

Correspondence to: Ali Dal. Department of Ophthalmology, Cornea Unit, Tayfur Ata Sökmen Faculty of Medicine Hospital, Hatay Mustafa Kemal University, Hatay 31060, Türkiye. alidal19@hotmail.com

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Dear Editor,

We read with great interest the recent article by Omar and Safwat Elhiny^[1] entitled “Simultaneous versus sequential corneal cross-linking and intracorneal ring segments implantation for keratoconus: two-year study” published in the *International Journal of Ophthalmology*. The authors should be commended for addressing a clinically important yet unresolved issue: the optimal timing of corneal cross-linking (CXL) when combined with intracorneal ring segment (ICRS) implantation.

Their study provides valuable long-term evidence demonstrating that simultaneous ICRS implantation or early postoperative CXL (within one month) yields more pronounced and sustained keratometric and refractive improvements compared with delayed CXL at three months. This work contributes meaningfully to the ongoing debate regarding whether treatment sequencing represents a mere logistical consideration or a true biomechanical determinant of outcome.

In this context, we would like to share complementary observations from our recently published study, which evaluated 69 eyes with moderate-to-severe keratoconus treated either with simultaneous ICRS+CXL or ICRS performed at least six months after prior CXL^[2]. Although our study differs methodologically from that of Omar and Safwat Elhiny^[1], particularly in treatment sequence and follow-up duration,

several converging biomechanical concepts emerge.

First, both studies support the principle that corneal biomechanical status at the time of ICRS implantation critically influences corneal reshaping. Omar and Safwat Elhiny^[1] elegantly demonstrated that delaying CXL for three months after ICRS reduces the magnitude of corneal flattening, suggesting loss of the optimal remodeling window. In our cohort, we observed that performing ICRS in a cornea previously stiffened by CXL resulted in less pronounced reductions in Kmax, K1, and K2 compared with simultaneous treatment. While the delayed strategies in the two studies are not directly equivalent (ICRS–CXL versus CXL–ICRS), both findings are consistent with the concept that increased stromal rigidity limits the mechanical effect of ring segments.

Second, regarding refractive outcomes, Omar and Safwat Elhiny^[1] reported sustained improvements in spherical equivalent and visual acuity over a 24-month period, particularly in the simultaneous and one-month groups. In our study, refractive improvements—especially in cylindrical error—were also more pronounced in the simultaneous group at six months. We acknowledge that the relationship between keratometric flattening and refractive change is complex and not strictly linear; nevertheless, the parallel direction of topographic regularization and refractive improvement in both studies supports a shared biomechanical mechanism rather than a coincidental association.

Importantly, we recognize the limitations of our own data, including the retrospective design and shorter follow-up, which preclude conclusions regarding long-term stability. For this reason, we view our findings not as confirmatory replication, but as supportive evidence reinforcing the biomechanical rationale proposed by Omar and Safwat Elhiny^[1]. Their two-year follow-up adds critical temporal validation to a concept that shorter studies, including ours, can only suggest.

From a clinical standpoint, the combined interpretation of these studies underscores that the timing of CXL relative to ICRS implantation is not merely a matter of convenience. Rather, it appears to define a therapeutic window during which corneal remodeling can be maximized before biomechanical stiffening limits further shape change. While patient-specific factors must

always guide decision-making, these data collectively support prioritizing simultaneous or near-simultaneous treatment strategies when feasible in progressive or moderate-to-severe keratoconus.

We congratulate Omar and Safwat Elhiny^[1] on their important contribution and thank the Editorial Board for the opportunity to contribute to this discussion. We believe that continued prospective studies integrating biomechanical metrics and long-term follow-up will further refine patient-specific timing strategies in combined keratoconus management.

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Conflicts of Interest: Dal A, None.

REFERENCES

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