Effect of intraocular lens insertion speed on surgical wound structure

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PURPOSE: To evaluate the difference in the effect of 2 speeds of intraocular lens (IOL) insertion on the clear corneal wound structure.

SETTING: Ouchi Eye Clinic, Kyoto, Japan.

DESIGN: Prospective randomized clinical trial.

METHOD: Eyes that had phacoemulsification and Acrysof IQ IOL implantation using a screw-plunger type injector were randomly divided into 2 equally sized groups as follows: Group F, fast IOL insertion (1 revolution per second [rps]) plunger speed, and Group S, slow IOL insertion (¼ rps). The change in wound-size between before IOL insertion and after IOL insertion, need for corneal hydration, surgically induced astigmatism (SIA), and optical coherence tomography (OCT) findings of the corneal wound structure were compared. Comparative laboratory measurements of the cross-sectional surface between empty cartridges and those with an IOL loaded inside were also performed.

RESULTS: Eighty eyes were enrolled. The change in wound size was significantly larger in Group S ($P=.002$). Corneal hydration was required in 11 of 40 eyes in Group F and in 21 of 40 eyes in Group S ($P=.04$). Changes in OCT findings were also more prominent in Group S ($P=.003$). There were no significant differences in SIA. Laboratory examination of the cartridges showed that the vertical diameter of the cross-sectional area was significantly larger when the IOL was loaded than when the cartridge was empty.

CONCLUSION: When an injector system was used, slow IOL insertion affected clear corneal wound structure more than fast IOL insertion.

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To date, the use of an injector system has become a standard procedure for intraocular lens (IOL) insertion, and various injector systems have been designed for microincision cataract surgery. In addition, phacoemulsification can be performed through a 0.9 mm incision with bimanual phacoemulsification[1,2] or through a 1.8 mm incision with microcoaxial phacoemulsification.[3] New IOL designs and injector systems have been developed to adapt to the technological changes. Moreover, studies[4,5] have evaluated the relationship between various types of IOLs, injector systems, insertion techniques, and incision sizes. In these systems, an IOL produced from a soft material is tightly rolled and then drawn into the cartridge. Hence, the injector cartridge is sometimes forced to expand, leading to a stretching force against the wound, especially when the IOL optic is passing through the wound.

A clear corneal wound is considered vulnerable to the stress caused by an IOL injector. Thus, it is reasonable to assume that the time required for an IOL to pass through the wound during insertion may affect wound damage. To our knowledge, this is the first study to directly consider this subject. The purpose was to examine the impact of 2 speeds of IOL insertion on the surgical wounds. In addition, laboratory experiments were performed to measure the cartridge sizes, with and without the IOLs loaded, to more clearly elucidate the impact of IOL implantation on the surgical wound.

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