Abstracts

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Factors affecting outcome of punctoplasty surgery: a review of 205 cases

Shahid H, Sandhu A, Keenan T, Pearson A
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Punctoplasty (alternatively know as the one-, two or three-snip procedure) is a common procedure carried out by ophthalmic surgeons for punctal stenosis in the management of symptomatic epiphora. It is a simple procedure that may be carried out by both oculoplastic specialists and general ophthalmic surgeons. This study reviews the indications, surgical techniques and outcomes of punctoplasty surgery for 205 patients in a 4-year period. The aim was to identify factors that might lead to an improved surgical outcome. The influence of surgical technique, grade of operating surgeon and the choice of postoperative topical medication were assessed.

Authors identified all patients who underwent punctoplasty surgery from April 2002 to June 2006 within the Royal Berkshire NHS Trust, UK. No patient had an additional procedure simultaneously. Hospital records were used to ascertain the proportion of patients who were appropriately assessed preoperatively, the anatomical and functional success rates for surgery and the patient satisfaction rate. We assessed the influence of surgical technique, grade of operating surgeon and the use of postoperative topical medication on these outcomes.

Eighty-two per cent of patients had an appropriate preoperative assessment. Amongst these, the anatomical and functional success rates for punctoplasty surgery were 91% and 64%, respectively. The patient satisfaction rate was 71%. The grade of surgeon did not significantly affect outcome of punctoplasty ($p = 0.4$). The use of topical steroids postoperatively did not significantly improve surgical outcome (p 0.7). There was no significant difference in anatomical success between a two-snip versus a three-snip punctoplasty technique ($p = 0.7$). However, in the presence of anatomical success the two-snip procedure gave significantly greater functional success ($p = 0.03$).

Authors concluded with the remarks that this is the largest reported consecutive case series of isolated punctoplasty surgery. Overall anatomical success was high and the surgical technique, grade of surgeon and choice of postoperative medication did not significantly alter the outcome. Without adequate preoperative assessment a significant proportion of patients may undergo surgery inappropriately. Even with an adequate assessment anatomical success is not always followed by resolution of epiphora.

Changes in corneal wavefront aberrations in microincision and small-incision cataract surgery

Tong N, He JC, Lu F, Wang Q, Qu J, Zhao YE
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In microincision cataract surgery (MICS), the incision is approximately 1.5mm, which is about half the size of the incision in small-incision cataract surgery (SICS). Because of the smaller incision, MICS is expected to have less effect than SICS on the optical quality of the corneal. This has been shown in studies of corneal astigmatism, which found less induced astigmatism with MICS than with SICS.

At present, the most widely used technique for evaluating corneal optical quality is corneal topography, which produces color maps that show, among other things corneal astigmatism. Another technique, wavefront analysis, allows quantitative characterization of localized changes in the corneal shape with Zernike polynomial functions from the same set of the corneal topography data, given that the system is carefully calibrated.

The purpose of this study was to evaluate effect of incision size on the optical quality of the anterior cornea by comparing the changes in corneal wavefront aberrations between microincision cataract surgery (MICS) and small incision cataract surgery (SICS).

This prospective randomized clinical study included 36 eyes having MICS (1.5 mm) and 38 eyes having SICS (3.0 mm). Anterior corneal topography

was measured preoperatively and 3 to 6 months postoperatively. The data were used to calculate anterior corneal Zernike aberrations (through the 6th order) for a 6.0 mm central area.

In the MICS group, 2 corneal Zernike aberrations (trefoil and tetrafoil) changed significantly from preoperatively to postoperatively (both P<.0001). In the SICS group, in addition to trefoil and tetrafoil, oblique astigmatism (P<.0001), secondary oblique astigmatism (P = .001), and vertical tetrafoil (P = .001) changed significantly. The SICS group had greater changes than the MICS group in oblique astigmatism (P = .0001), oblique trefoil (P = .0035), and vertical tetrafoil (P = .0023). The changes in the SICS group were significantly greater than in the MICS group in the total root mean square (RMS) (P = .007) and higher-order RMS (P = .023) of corneal wavefront aberrations.

Authors concluded with the remarks that cataract surgery-related changes in corneal wavefront aberrations were dependent on incision size. The MICS technique had advantages over the SICS technique in minimizing the effect of the incision size on the optical quality of the cornea.

Higher-order aberrations induced by nuclear cataract

Lee J, Kim MJ, Tchah H
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Cataract is a major cause of visual decline in older people. Of the many kinds of opacities, nuclear cataracts have a strong relationship to the aging process. Older people have decreased visual function as nuclear sclerosis progresses due to the change in the refractive index, which can in turn result in refractive errors. However, the deterioration in visual function in these patients cannot be entirely explained by spherical or cylindrical refractive errors. Nuclear cataract can also decrease visual function by affecting contrast sensitivity. Deterioration in contrast sensitivity can be explained in terms of scatter and increased higher-order aberrations (HOAs). Scatter is more relevant to the peripheral cortex than the central lens. Thus, scatter affects visual function, especially in those with cortical cataract. Because scatter is unlikely to contribute to contrast sensitivity in eyes with nuclear cataract, HOAs may play a more important role in decreased contrast in patients with this type of cataract.

The introduction of wavefront sensors in clinical practice has provided clinicians with an effective method of examining visual quality in more objective and definitive terms. One such method is to measure HOAs. In this study, we analyzed HOAs in entire eyes and in the internal optics (lenses) in patients with various grades of nuclear cataracts.

The purpose of this study was to measure higher-order aberrations (HOAs) in the entire eye and in the internal optics (lens) in patients with nuclear cataract.

A visual function analyzer that combines ray-tracing aberrometry and corneal topography was used to measure wavefront aberrations in 33 eyes of 20 patients who had nuclear cataract.

The wavefront maps of the entire eye were similar to those of the internal optics. The average root mean square (RMS) of HOAs in the entire eye and in the internal optics was 1.59 μm and 2.13 μm, respectively, with an optical zone of 6.5 mm. The predominant HOA in the entire eye and the internal optics was coma; the mean RMS of coma was 0.98 μm in the entire eye and 1.28 μm in the internal optics. The spherical aberration of the internal optics correlated negatively with the grade of nuclear cataract (r = -0.450, P = .009).

Authors concluded with the remarks that most HOAs in eyes with nuclear cataracts were due to the internal optics; coma was the predominant HOA. The grade of nuclear cataract was negatively correlated with the amount of spherical aberration. These findings may explain the subjective symptoms in patients with nuclear cataract.

Estimation of the effective lens position using a rotating Scheimpflug camera

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Intraocular lens (IOL) power calculations are difficult in eyes that have had refractive surgery. There are 2 main sources of errors. First, inaccurate calculation of the corneal power from the anterior corneal radius can occur when the standardized keratometric index of 1.3375 is used. Second, incorrect estimation of the post cataract surgery IOL position (effective lens position [ELP]) by third-generation or fourth-generation theoretical IOL power calculation formulas can occur when the corneal power value after refractive surgery (Kpost) is used. This leads to underestimation of the ELP and thus of IOL power, resulting in hyperopia

even when the postoperative corneal power is derived by a clinical history method.

To overcome these problems, several methods have been proposed, of these, the double-K clinical history method seems to be promising. In this method, the keratometry (K) value before refractive surgery (Kpre) is used for ELP estimation, and Kpost is used for the IOL power calculation by the vergence formula. This approach improves the accuracy of the IOL power calculation after laser in situ keratomileusis (LASIK) and photorefractive keratectomy (PRK). Although it is a good method, the double-K clinical history method requires knowledge of historical data, including the kpre value. If the kpre value is unavailable, it will be difficult to obtain the ELP used in the third-generation or fourth-generation formulas and thus difficult to apply the double-K method.

The purpose of this study was to describe a no-history method of estimating the effective lens position (ELP) for double-K intraocular lens (IOL) power calculation in eyes that had previous refractive surgery.

The corneal height (Hm) and anterior chamber diameter (AGm) in 106 unoperated eyes were measured using a rotating Scheimpflug camera. The theoretical anterior corneal radius (Rrt) was then derived from Hm and AGm by regression and rearrangement of the Fyodorov equation. The ELP estimate was then calculated from Rrt. The performance of this ELP estimation method in double-K IOL power calculation and the performance of other methods were compared retrospectively in 11 eyes having cataract surgery that had previous refractive surgery. The refractive results 9 to 12 weeks after cataract surgery were selected for data analysis.

The new ELP estimation method, combined with the BESSt formula or the Savini et al. method for estimating post refractive-surgery corneal power (Kpost) in the double-K SRK/T formula, provided the best IOL power prediction results. The mean arithmetic and absolute IOL prediction errors were -0.05 ± 0.62 diopters (D) and 0.49 ± 0.34 D, respectively, when combined with the BESSt formula and 0.03 ± 0.73 D and 0.60 ± 0.36 D, respectively, when combined with the Savini et al. method. With either combination, all 11 eyes were within ± 1.00 D of the refractive prediction error.

Authors concluded with the remarks that this ELP estimation method may be helpful for IOL power calculation in post refractive surgery eyes when historical data are unavailable.