Microcoaxial Torsional Cataract Surgery
1.8 mm Versus 2.2 mm: Functional and Morphological Assessment

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BACKGROUND AND OBJECTIVE: To compare functional and morphological outcomes of 1.8-mm versus 2.2-mm microincision coaxial cataract surgery (MCCS).

PATIENTS AND METHODS: Thirty eyes of 30 patients that underwent MCCS were randomized to two groups: 1.8-mm MCCS (group 1: 15 eyes) and 2.2-mm MCCS (group 2: 15 eyes).

RESULTS: There were no significant between-group differences in uncorrected visual acuity, best-corrected visual acuity, keratometric astigmatism, and endothelial cell count. One day postoperatively, a greater increase of corneal thickness at the incision site was observed in group 1 compared to group 2 using anterior segment optical coherence tomography with no significant differences in tunnel morphometric features and confocal microscopy showed more tunnel edema in group 1 versus group 2 that resolved in both groups.

CONCLUSION: Both 1.8- and 2.2-mm torsional MCCS were safe and efficient with easy surgical maneuvers and excellent functional and morphological results; 1.8-mm MCCS induced slightly greater tunnel edema shortly after surgery that resolved in the medium term.

INTRODUCTION

The need for faster visual rehabilitation and improvement of postoperative visual capacity gave a boost to cataract surgery development aiming to reduce surgically induced astigmatism. Several studies demonstrated that postoperative corneal astigmatism is related to incision size, particularly for incisions greater than 3 mm. Moreover, degradation of the optical quality of the cornea after corneal incision due to the increment of high-order aberrations, particularly third-order aberrations such as trefoil, have been shown.

Microincision cataract surgery (MICS) with bimanual technique reducing the incision size between 1.5 and 1.8 mm with separate instruments for phacoemulsification and irrigation improved visual performance of pseudo-
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Dophakic patients with better preservation of the corneal aberrometric pattern. Microincision coaxial cataract surgery (MCCS) allowing coaxial phacoemulsification through an incision of 2.0 mm or less also demonstrated good results with low surgically induced astigmatism. By reducing the amount of induced astigmatism, MICS and MCCS are increasingly viewed as refractive procedures and recent studies did not evidence a significant difference in surgically induced astigmatism between the two techniques. Nevertheless, the astigmatism control is not the only requirement for a faster visual rehabilitation because cataract surgery induces tissue trauma that should be minimized as much as possible to improve optical outcomes.

Endothelial cell damage has been evaluated after small-incision cataract surgery and MICS, and the incision size is not a factor influencing endothelial cell loss. Phaco time, ultrasound energy, mechanical trauma by instruments, corneal manipulation, fluid turbulence, and sleeveless phaco are among the main factors involved in endothelial cell integrity. Ex vivo histological and in vivo anterior segment optical coherence tomography (AS-OCT) studies of the incision have also been performed to assess tissue trauma after surgery and particularly to assess the anatomical integrity of the tunnel. Some authors have shown a greater alteration of tunnel morphology after MICS with bimanual technique compared to conventional small-incision cataract surgery and MCCS. Elkady et al. confirmed these results showing less corneal thickening temporally to the incision in MCCS compared with bimanual MICS, but revealed less corneal edema and less central corneal thickening shortly after surgery in bimanual MICS compared with MCCS.

The aim of our study was to compare functional and morphological observations after 1.8-mm versus 2.2-mm MCCS.

Patients and Methods

This prospective study comprised 30 eyes of 30 patients with cataract who were candidates for phacoemulsification and intraocular lens implantation. The inclusion criteria were age between 65 and 75 years, axial length between 23.0 and 24.0 mm, corneal astigmatism less than 3.00 diopters (D), nuclear cataract of grade 4 (nuclear opalescence-NO4, Lens Opacities Classification System III), and corneal endothelial cell count greater than 1,200/mm². The exclusion criteria were anterior segment pathological alterations such as keratoconus, chronic uveitis, zonular dialysis, pseudoexfoliation syndrome, glaucoma, and diabetes mellitus; other ocular pathologies impairing visual function; previous anterior or posterior segment surgery; and intraoperative or postoperative complications.

Patients matching the inclusion and exclusion criteria were randomized into two groups and underwent MICS. Group 1 (15 eyes) underwent 1.8-mm MCCS and group 2 (15 eyes) underwent 2.2-mm MCCS.

Before cataract surgery, patients had a complete ophthalmologic examination including manifest refraction, corneal topography by Keratron-Optikon 2000 (Rome, Italy), slit-lamp examination, applanation tonometry, and optical coherence tomography. The technical characteristics of the HRT II laser scanning confocal microscope have been previously described. During the examination, the patient was seated in front of the microscope, the head was held steady by the aid of a headrest, and the eye was properly aligned to obtain tangential optical section of the central cornea using a dedicated target mobile bright red light provided with the instrument that the patient had to fix with the fellow eye. A digital camera furnished a lateral view of the eye and objective lens to check the position of the objective lens on the surface of the eye for each scan. The confocal laser microscopy objective lens was put gently in contact with the ocular surface separated by a polymethylmethacrylate contact cap and a drop of 0.2% polyacrylic gel (Viscoat®; CIBA Vision Ophthalmics, Marcon, Venezia, Italy) served as coupling medium.

Sequential images derived from automatic scans and manual frame acquisition were acquired and mean endothelial cell density was calculated counting cells manually within an area of interest of 250 × 250 µm. Three images per eye were taken and the mean of the three counts was considered. Cell densities are given per square millimeters (cell/mm²). In vivo confocal microscopy by HRT II laser scanning microscope was also used to evaluate corneal morphology at the tunnel site. Sequential images with automatic and manual scan acquisitions were captured for each examined eye at the incision site by inviting the patient to fixate the dedi-
cated target mobile red light with the contralateral eye in down gaze. The best epithelial, stromal, and endothelial images acquired were analyzed by an examiner masked to the group the patient belonged to.

Moreover, in all cases the corneal thickness at the incision site was measured with AS-OCT (Visante Model 1000; Carl Zeiss Meditec, Inc., Dublin, CA). AS-OCT Visante performs low- and high-resolution anterior segment imaging and biometry by using the time of delay of light as it travels through ocular tissues and obtains at the same time information about the reflectivity of the scanned structures and their density and biometric parameters. For the AS-OCT examination, each patient was seated in front of the camera; the head was held steady by the aid of a chin rest and a forehead support. In each scan, the upper eyelid was gently elevated to obtain a better exposure of the incision site. High-resolution mode cross-sectional scans at the incision site were obtained for each patient and scans of the best quality were chosen to measure corneal thickness and to analyze corneal morphometric features at the incision. The corneal thickness was calculated using a caliper provided by the instrument software for biometric measurement as the maximum length between the epithelium and the endothelium on a line crossing the incision tangential to the corneal surface.

All data were calculated analyzing the best image obtained in a series of three images by an examiner masked to the group the patient belonged to. The main outcome measures were uncorrected and best-corrected visual acuity, keratometric astigmatism, endothelial cell count, and corneal thickness at incision site. The amount and axis of astigmatic change induced by the cataract surgery were assessed by calculating the surgically induced astigmatism.

Power vector analysis of keratometric astigmatic change between preoperative and postoperative values was performed. To visualize the change in astigmatism induced by surgery, the astigmatic components of the power vector were analyzed by the two-dimensional vector equation $J_{0} (J_{45})$, which is the projection of the three-dimensional power vector into the astigmatism plane formed by the coordinate axes $(J_{0} J_{45})$. Vector analysis of preoperative and postoperative keratometric parameters was also performed to assess surgically induced astigmatism according to the Alpins method and the Polar Plotter v.1.7 add-in for Microsoft Excel (Microsoft Corporation, Redmond, WA) was used to display graphically individual surgically induced astigmatism vectors.

Intraoperative measurements included mean torsional time, cumulative dissipated energy, and balanced salt solution used. The scheduled follow-ups of the main parameters evaluated in the study were set at 1, 7, 30, and 90 days postoperatively.

The study was approved by the University Institutional Review Board and was performed in accordance with the ethical principles of the Declaration of Helsinki. Every patient signed the informed consent after both surgical methods were explained.

### Randomization

Patients were randomly assigned to group 1 or group 2 the day before surgery by block randomization (randomly assigned by computer-generated numbers). Group 1 (15 eyes) underwent 1.8-mm MCCS and group 2 (15 eyes) underwent 2.2-mm MCCS. The surgeon and the operating room staff were aware of the patient’s assignment to the first or the second group. Patients and examiners performing preoperative and postoperative controls were masked to the surgical technique used in each case.

### Surgical Technique

In all cases, uneventful MICS was performed by the same surgeon (LM) using Ozil Infiniti (Alcon Laboratories, Fort Worth, TX) torsional phacoemulsification. In both groups, a 0.9-mm, 30° ABS mini-flared Kelman (22° bent) tip was used with 0.9-mm MicroSmooth Ultra and Nano Infusion Sleeve in groups 1 and 2, respectively.

All patients received topical anesthesia with oxybuprocaine. After a 1.8- and 2.2-mm clear corneal tunnel in the right side was made in groups 1 and 2, respectively, a 5- to 6-mm curvilinear capsulorhexis was created. All surgeries were performed with a divide-

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### TABLE 1
Mean ± Standard Deviation of Surgical Intraoperative Parameters of the Two Groups (1.8 and 2.2 mm)

<table>
<thead>
<tr>
<th>Variable</th>
<th>1.8 mm</th>
<th>2.2 mm</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean cumulative dissipated energy</td>
<td>13.8 ± 6.3</td>
<td>10.2 ± 4.0</td>
<td>.465</td>
</tr>
<tr>
<td>Mean torsional time (sec)</td>
<td>43.3 ± 12.5</td>
<td>35.7 ± 15.8</td>
<td>.314</td>
</tr>
<tr>
<td>Balanced salt solution (mL)</td>
<td>36.8 ± 7.2</td>
<td>30.6 ± 10.9</td>
<td>.360</td>
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</tbody>
</table>

* Mann-Whitney U test, 1.8 vs 2.2 mm.
and-conquer technique using linear amplitude (100% limits) continuous torsional phacoemulsification.

An intraocular lens (AcrySof SN60WF; Alcon Laboratories) was implanted in the capsular bag with Monarch III injector and Monarch D Cartridge (Alcon Laboratories). In the 1.8-mm group, a wound-assisted injection was performed. The incision was not sutured.

The postoperative therapy consisted of ofloxacin 0.3% and dexamethasone 0.2% eye drops four times daily for 3 weeks.

**Statistical Analysis**

The main parameters evaluated in this study included the refractive parameters (keratometric astigmatism), the visual parameters (uncorrected visual acuity and best-corrected visual acuity), endothelial cell count, and corneal thickness at incision site preoperatively and at 1, 7, 30, and 90 days after surgery. All quantitative parameters were expressed as mean ± standard deviation (SD) and the results were reported separately for each of the two groups (1.8 and 2.2 mm). The AS-OCT features of the corneal incision were summarized as percentage of presence of the different patterns of tunnel morphology and the results were reported separately for each group at each postoperative control.

The statistical analysis was performed using non-parametric tests. The Mann–Whitney U test was applied for assessing the comparison of the quantitative variables between two groups (1.8 and 2.2 mm) and the Friedman test was applied for within-group comparison. Fisher’s exact test was used to assess the statistical significance of differences between the two groups for the percentage of AS-OCT features. Statistical analysis was performed using SPSS Advanced Statistical 10.0 software (Chicago, IL).

**RESULTS**

The mean age was 70.11 ± 3.69 years (range: 65 to 75 years) in group 1 and 69.44 ± 3.43 years (range: 65 to 75 years) in group 2 (P > .05).

The intraoperative surgical system parameters such as mean cumulative dissipated energy, mean torsional time, and mean balanced salt solution used were not significantly different between the two groups (Table 1). There were no statistically significant differences between groups according to preoperative keratometric topographic cylinder, uncorrected visual acuity and best-corrected visual acuity, endothelial cell count, and corneal thickness (P > .05) (Tables 2-6).

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**TABLE 2**

<table>
<thead>
<tr>
<th>Time</th>
<th>UCVA</th>
<th>BCVA</th>
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<tbody>
<tr>
<td></td>
<td>1.8 mm</td>
<td>2.2 mm</td>
</tr>
<tr>
<td>Pre-surgery</td>
<td>0.50 ± 0.18</td>
<td>0.56 ± 0.16</td>
</tr>
<tr>
<td>1 day</td>
<td>0.14 ± 0.09</td>
<td>0.13 ± 0.11</td>
</tr>
<tr>
<td>7 days</td>
<td>0.16 ± 0.06</td>
<td>0.11 ± 0.12</td>
</tr>
<tr>
<td>30 days</td>
<td>0.12 ± 0.09</td>
<td>0.14 ± 0.12</td>
</tr>
<tr>
<td>90 days</td>
<td>0.12 ± 0.09</td>
<td>0.12 ± 0.09</td>
</tr>
</tbody>
</table>

|          | 1.8 mm        | 2.2 mm        | P  |
|----------|---------------|---------------|
| Pre-surgery | 0.41 ± 0.12   | 0.41 ± 0.12   | .661 |
| 1 day    | -0.06 ± 0.05  | -0.06 ± 0.05  | .905 |
| 7 days   | -0.06 ± 0.05  | -0.06 ± 0.05  | .905 |
| 30 days  | -0.06 ± 0.50  | -0.07 ± 0.05  | .842 |
| 90 days  | -0.06 ± 0.05  | -0.06 ± 0.05  | .905 |

P < .001 < .001 < .001  

UCVA = uncorrected visual acuity; BCVA = best-corrected visual acuity.

*Mann–Whitney U test, 1.8 vs 2.2 mm.

*Friedman test.

**TABLE 3**

| Time     | 1.8 mm         | 2.2 mm         | P  |
|----------|----------------|----------------|
| Pre-surgery | 1.08 ± 0.81    | 0.85 ± 0.66    | .497 |
| 1 day    | 1.20 ± 0.73    | 1.13 ± 0.67    | .968 |
| 7 days   | 1.33 ± 0.58    | 0.98 ± 0.70    | .156 |
| 30 days  | 1.19 ± 0.71    | 1.15 ± 0.83    | .762 |
| 90 days  | 1.16 ± 0.77    | 1.08 ± 0.78    | .604 |

P = .423 .263  

*Mann–Whitney U test, 1.8 vs 2.2 mm.

*Friedman test.
Visual and Refractive Outcome

Postoperative uncorrected visual acuity and best-corrected visual acuity increased significantly in both groups compared with preoperative values ($P < .001$), but were not significantly different between the two groups at all time points (Table 2). There were no statistically significant differences between preoperative and postoperative keratometric astigmatism expressed in absolute values for each group and between the two groups at all time points ($P > .05$) (Table 3). The changes in the astigmatic power vector between preoperative and postoperative values were not significantly different in group 1 and were significantly different in group 2 (Table 4). The between-group differences were not significantly different preoperatively and 90 days after surgery (Table 4). In vector analysis, the mean surgically induced astigmatism was 0.60 ± 0.19 D in group 1 and 0.64 ± 0.55 D in group 2; the between-group difference was not statistically significant ($P > .05$) (Fig. 1).

Endothelial Cell Count and Corneal Thickness at Incision Site

Postoperatively, there was a significant decrease in endothelial cell count at the center of the cornea in both groups compared with preoperative values ($P < .001$) without statistically significant differences between the two groups at all time points ($P > .05$) (Table 5). The corneal thickness at incision site 1 day postoperatively increased significantly in both groups compared with preoperative values with significantly higher values in group 1 (57% ± 12% of increase) compared to group 2 (41% ± 8% of increase) ($P = .006$). At 7 days postoperatively, there was a reduction of incisional corneal thickness in both groups compared to the previous
time point without statistically significant differences between the two groups. At 30 and 90 days postoperatively, corneal thickness was not significantly different between the two groups (Table 6).

**In Vivo Confocal Microscopy and AS-OCT Features**

Analysis of tunnel morphology by means of in vivo confocal microscopy showed a similar pattern of corneal healing in all patients with slight morphological differences between 1.8- and 2.2-mm incisions. One day postoperatively, epithelial disruption with epithelial ingrowth toward anterior stroma, a linear incision with slightly greater edema of the margins in group 1 compared to group 2, and preserved endothelium were observed in both types of incisions (Figs. 2 and 3). Corneal edema completely disappeared after several days. Both techniques showed a restored epithelial layer with a moderately reflective linear acellular scar, minimal epithelial downgrowth, and undamaged endothelium at 90 days postoperatively (Figs. 4 and 5). AS-OCT showed different tunnel architectures: endothelial and epithelial gaping, misalignment at epithelial and endothelial side, localized detachment of Descemet’s membrane, and loss of coaptation along tunnel margins detected prevalently in one-plane tunnel. No significant between-group differences of percentages of different AS-OCT patterns were evidenced postoperatively at the different controls (Table 7).

The different AS-OCT patterns modified similarly over time, generally independently of incision size. Endothelial gaping usually reduced in extension but was still present at 90 days after surgery; sometimes it disappeared with residual misalignment of endothelial margins (Figs. 6 and 7). Epithelial gaping disappeared during the first month (Fig. 8). Localized detachment of Descemet’s membrane disappeared during the first month with complete apposition of Descemet’s membrane and endothelium to the posterior stroma (Fig. 6). In all cases, complete adhesion along tunnel margins was observed after 7 days.

**DISCUSSION**

In cataract surgery, the need for smaller incisions to achieve better results in terms of safety and efficacy...
has characterized technological advances over the past decades, particularly concerning phacoemulsification technique and intraocular lens design and materials. By reducing the incision size from 3 to 2 mm or less, conventional small-incision cataract surgery gave way to MICS being increasingly used for cataract removal and also viewed as a refractive procedure.

MICS with either bimanual or coaxial technique
has been demonstrated to induce a small amount of surgically induced astigmatism with lower values of astigmatism and less modification of corneal wavefront error, particularly third-order, compared to conventional small-incision phacoemulsification.  

Alio et al. reported a surgically induced astigmatism of 1.2 D in...
50 eyes after small-incision cataract surgery compared with 0.36 D in 50 eyes after bimanual MICS. Yao et al. observed a surgically induced astigmatism of 0.78 D compared to 1.29 D 1 month after surgery in patients who underwent bimanual MICS and small-incision cataract surgery, respectively, without significant differences of high-order aberration induction between the two groups. Denoyer et al. described a greater increase in third-order trefoil aberrations and of fifth-order in patients after small-incision cataract surgery compared to bimanual MICS without significant differences between the groups concerning induced astigmatism.

Discordant data among different studies regarding comparison between small-incision cataract surgery and MICS are related to the site of incision, amount of preoperative corneal astigmatism, methods of wavefront error evaluation, and design of clinical trial. Despite this, according to several authors, MICS is an unquestioned technological improvement over small-incision cataract surgery.

When evaluating the efficacy and safety of cataract procedures, tissue trauma should also be considered, particularly analyzing endothelial cell damage and integrity of tunnel anatomy. Several authors did not correlate tissue trauma to incision size, stating that a higher endothelial cell loss is particularly related to intraoperative surgical parameters (phaco time, ultrasound energy) and to a sleeveless phaco procedure. Less endothelial cell loss has been observed by some authors with coaxial phacoemulsification compared to MICS with bimanual technique, whereas other authors did not disclose any difference between these two techniques.

No differences were observed in a short postoperative period between MICS with coaxial technique and bimanual technique in a recent study. Integrity of tunnel anatomy has been evaluated in ex vivo histological studies comparing microincision and small-incision cataract surgery technique and a greater alteration of tunnel morphology was demonstrated after bimanual MICS than with coaxial MICS and small-incision cataract surgery. It is believed that bimanual phacoemulsification creates mechanical damage of the tunnel due to insertion of instruments through a small incision and that temperatures increasing at the incision site due to the sleeveless procedure further induce tissue damage. An in vivo study with AS-OCT by Dupont-Monod et al. showed greater edema at the incision site with bimanual compared to microcoaxial and small coaxial technique, thus confirming ex vivo studies finding greater alteration of the tunnel anatomy with sleeveless phacoemulsification compared to the sleeved-tip one related to the incision dimension and the absence of the sleeve.

In accordance with previous studies, Elkady et al. found less corneal thickness temporally to the incision in MCCS with 2.2-mm incision compared to bimanual MICS with 1.4-mm incision, but only 1 day after surgery. Incision features and particularly apposition of the incision margins were not significantly different between the two groups.

In our study, MICS was performed using two different incision sizes of 1.8 and 2.2 mm with torsional microincisinal coaxial technique to evaluate the surgically induced astigmatism, endothelial cell damage,
and tunnel integrity. Both incision sizes showed a low amount of surgically induced astigmatism without statistically significant between-group differences demonstrating that the induction of astigmatism is negligible for an incision slightly larger or smaller than 2 mm. The mean astigmatic change preoperatively and 90 days postoperatively (0.60 ± 0.19 D in group 1 and 0.64 ± 0.55 D in group 2) was not significantly different between the two groups. Similar results were observed by other authors comparing coaxial and bimanual MICS and MCCS with an incision of greater than or less than 2.0 mm. Wilczynski et al. reported a mean surgically induced astigmatism of 0.42 D in vector analysis and of 0.23 D in vector decomposition method after 1.8-mm coaxial MICS without statistically significant differences compared to 1.7-mm bimanual MICS.10

Lee et al. reported no significant differences between coaxial MICS with incisions of 1.8 and 2.2 mm, with a surgically induced astigmatism ranging from 0.29 to 0.40 D in the 1.8-mm group and 0.31 to 0.52 D in the 2.2-mm group according to different nuclear opacification grade.10 Corneal endothelial cell loss was significant compared with preoperative values progressively reducing over time and was not different between the two groups. At 3 months postoperatively, the percentage of endothelial cell count loss was 21.19% in group 1 and 23.38% in group 2.

Endothelial cell count loss with MICS with bimanual technique was found to vary between 4.5% and 9.3% after MICS with bimanual technique in different studies.5,9,11,13 After coaxial MICS, Dosso et al.24 reported an endothelial cell loss of approximately 4.5% and Lee et al.10 an endothelial cell loss varying between 8.9% and 20.6% according to different cataract grade and incision dimension (1.8 vs 2.2 mm). Different percentages of endothelial cell loss among different studies are related to several factors, as already mentioned, and particularly to nucleus grade, patient’s age, ultrasound energy, phaco-emulsification time, corneal distortion and mechanical trauma by instruments, and fluid turbulence.

The higher percentage of endothelial cell count loss in our study compared to the results of some authors is possibly related to the high grade of cataract density included in our study and the longer follow-up because endothelial cell density continues to decrease after surgery over time. To our knowledge, this is the first in vivo confocal microscopy study of the incision size in cataract surgery demonstrating that the morphologic appearance of the tunnel is similar with different incision dimensions apart from slightly more edema during the first days in the 1.8-mm versus the 2.2-mm group. A greater corneal thickness at incision site, mainly due to corneal edema, was also observed in 1.8-mm MCCS compared to 2.2-mm MCCS with AS-OCT reducing during the first month.

We observed slightly greater difficulty in intraocular lens insertion with the 1.8-mm incision compared to the 2.2-mm incision, probably due to the mismatch between the dimensions of the Monarch D cartridge and tunnel. We hypothesize that this mechanical stress caused the greater edema of the tunnel because none of the intraoperative surgical parameters were significantly different between the two groups. However, after the first month no differences in the tunnel morphology and morphometry were observed between the two groups. The use of the Monarch D cartridge, which is not recommended for 1.8-mm incision, is probably questionable. Nevertheless, we performed a wound-assisted injection causing less stress of the wound compared to standard injection. Moreover, the Monarch E cartridge recommended by Alcon Laboratories for 1.8-mm incision is still not commercially available.

Different architectural patterns of the tunnel by means of AS-OCT were detected in both groups without differences such as endothelial and epithelial gaping, misalignment at epithelial and endothelial side, and localized detachment of Descemet’s membrane. As already suggested in the literature, we believe that different patterns of tunnel morphology are related to angle of incision, intraocular pressure, corneal edema, and mechanical trauma by instruments.25 Moreover, the different AS-OCT patterns modified similarly over time regardless of incision size. Endothelial gaping usually decreased over time and sometimes disappeared with residual misalignment of endothelial margins. Epithelial gaping and localized detachment of Descemet’s membrane disappeared during the first month and loss of coaptation occurred after the first days.

Our results are partially in accordance with the findings of Elkady et al., who observed complete disappearance of all architectural features after bimanual and coaxial MICS at 1 month postoperatively.16 Unlike Elkady et al., we found there is not always complete recovery of tunnel morphometry and some tunnel features such as gaping or misalignment remain stable after surgery.
Coaxial MICS with either 1.8- or 2.2-mm incision achieves excellent functional and morphological results in the long term, thus demonstrating the safety and efficacy of a sleeved-tip procedure with microincision without significant differences between the two incision dimensions.

REFERENCES