Preparation of endothelial keratoplasty lenticules with Gebauer SLc Original versus Moria CBm Carriazo-Barraquer and Moria One-Use Plus microkeratomes

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Purpose: To investigate endothelial keratoplasty lenticules prepared from fresh whole eyes via Gebauer SLc Original (SLc) versus Moria CBm Carriazo-Barraquer (CBm), and those prepared from corneoscleral buttons via SLc versus Moria One-Use Plus (OUP) in terms of eye bank preparation criteria. Methods: Fresh whole eyes-dissected endothelial keratoplasty lenticules with SLc were compared with CBm in terms of thickness profile measurements, over/under dissection values, endothelial cell loss, and postoperative graft failures. A similar comparison was made between corneoscleral buttons-dissected endothelial keratoplasty lenticules with SLc and OUP. Results: Means of central thicknesses and increase of thickness toward periphery were not significantly different between 33 fresh whole eyes-dissected endothelial keratoplasty lenticules with SLc and 33 fresh whole eyes-dissected ones with CBm. There was no significant difference between 19 corneoscleral buttons-dissected endothelial keratoplasty lenticules with SLc and 19 corneoscleral buttons-dissected ones with OUP in terms of mean central thickness and post-cut endothelial cell loss. However, in the corneoscleral buttons-dissected endothelial keratoplasty lenticules, a mean increase of thickness was significantly different from central to two pericentral locations with OUP (P = 0.001) and from central to two peripheral parts with SLc (P = 0.011). Both CBm and OUP systems showed deeper dissection depths than head descriptions as compared to SLc (P < 0.001). Conclusion: Unlike fresh whole eyes-dissected endothelial keratoplasty lenticules with SLc or CBm, thickness profiles of corneoscleral buttons-dissected endothelial keratoplasty lenticules with both SLc and OUP systems showed a partial asymmetric increase of thickness toward the periphery. A high agreement was observed between endothelial keratoplasty lenticules thicknesses and SLc nomograms.

Key words: Corneoscleral button, endothelial keratoplasty lenticule, fresh whole eye, Gebauer SLc Original, Moria CBm Carriazo-Barraquer, Moria One-Use Plus

Descemet’s stripping automated endothelial keratoplasty (DSAEK) with an increasing trend in different countries around the world is the optimum remedy for corneal endothelial disorders.[1-4] The optimal lenticules for DSAEK have been prepared rapidly and consistently via automated dissection of donated corneas.[9,10] Hand-guided Moria Carriazo-Barraquer (CBm) and fully automatic systems such as Gebauer SLc Original (SLc) and Moria One-Use Plus (OUP) are suitable systems that are being used for the standard preparation of DSAEK tissues.[11,12] Although multiple factors can influence the thickness of provided DSAEK lamellae,[13-15] the SLc system excising its more agreement with the selected cutting depth was comparable with the CBm and OUP in terms of variability, lamellar surface roughness, or endothelial cell loss.[11,12]

In the Central Eye Bank of Iran, the majority of precut endothelial keratoplasty lenticules have been prepared from donated fresh whole eyes with a hand-guided CBm system.[16] However, there have been some instances in which whole eyes or corneoscleral buttons excised from whole eyes are subjected to either SLc- or OUP-automated systems. Given that there was no report on the preparation of endothelial keratoplasty lenticules from fresh whole eyes by using SLc versus CBm, and studies on the comparison between SLc and OUP systems were performed on limited numbers of cases,[11,12] this study was designed to address these issues.

Methods

In a retrospective cohort study between February 2017 and September 2017, endothelial keratoplasty lenticules prepared from fresh whole eyes via SLc versus CBm and endothelial keratoplasty lenticules prepared from corneoscleral buttons via SLc versus OUP were investigated in terms of thickness.

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profile measurements, failed preparation, dissection depths in form of over/under dissection values, endothelial cell loss, and postoperative graft failure. All the procedures were performed by an experienced eye bank technician (T. Ch.), in a grade “A” clean room. Fresh whole eyes of very good to excellent endothelial rating\(^{[10]}\) and without flat anterior chamber were selected. The single-pass technique of different pass times (range of 15–21s) was implemented in all the cases. The selection of microkeratome heads for Moria CBm/Moria OUP- and Gebauer SLc-dissected endothelial keratoplasty lenticules was based on the Nahum’s\(^{[17]}\) and Gebauer’s nomograms, respectively. The same digital tonometer (Icare PRO, Vantaa, Finland) and ultrasound pachymetry (SP-100; Tomey GmbH, Erlangen, Germany) were used in the study groups for measuring all intraocular pressures and corneal thicknesses, respectively. To conduct the study, full ethical approval was obtained from the Institutional Review Board of the Central Eye Bank of Iran and the ethics committee of the Ophthalmic Research Center at the Shahid Beheshti University of Medical Sciences, Tehran-Iran.

**Preparation of endothelial keratoplasty lenticules from fresh whole eyes**

Preparation of endothelial keratoplasty lenticules from fresh whole eyes by using CBm (Moria S.A., Antony, France) was performed as previously described.\(^{[16,17]}\) Briefly, after the total removal of corneal epithelium, the whole eye was tightly wrapped in sterile gauze and secured with straight hemostat forceps. The limbal area was vacuumed to increase intraocular pressure. By using the digital tonometer, the intraocular pressure was measured and after obtaining a constant pressure of above 70 mmHg, the central corneal thickness of the cornea was measured using the ultrasound pachymetry. Based on Nahum’s nomogram\(^{[18]}\) and pachymetry values, the microkeratomes heads (range: 300–450 µm) were selected and used to cut manually the anterior lamellar flap. After relocating the anterior lamellar flap on the posterior stromal bed, the excised corneoscleral disc was stored in Optisol GS (Bausch and Lomb, Irvine, CA, USA) by using a custom-designed mount\(^{[19]}\) and measurements in each corneoscleral buttons- and fresh whole eyes-dissected endothelial keratoplasty lenticules 12–15h after dissection.

The preparation steps of endothelial keratoplasty lenticules from fresh whole eyes with the SLc system (Gebauer Medizintechnik GmbH, Neuhausen, Germany) were almost similar to those prepared via CBm. Based on Gebauer’s nomogram and pachymetry values, cutting heads (range: 375–600 µm) were selected to remove anterior corneal lamella from the artificial anterior chamber-mounted corneoscleral button while pressing the automated footswitch. After repositioning the anterior corneal cap on the top of the posterior stroma, the corneoscleral button was returned to its Optisol GS medium.

As for the OUP system, all steps were similar to those described for the SLc system. The pressure of the artificial anterior chamber was set to 70 mmHg and “Speed 2” on the Moria control unit was selected for forwarding speed. Moreover, the cutting heads (range: 300–450 µm) used for removing anterior lamellar cap were chosen based on Nahum’s nomogram\(^{[18]}\) and pachymetry values.

**Slit-lamp biomicroscopic and specular microscopic examinations**

All donated corneas, whether in the form of fresh whole eyes or corneoscleral buttons were subjected to precut slit-lamp biomicroscopic examinations (Haag Streit, BQ 900, Koeniz, Switzerland) to exclude cases with prior ocular surgery, old stromal scar, and opacities, or any endothelial disorders. As for fresh whole eyes, endothelial cell density was approximated using 40× magnification of slit-lamp\(^{[10]}\) and fresh whole eyes of very good to excellent endothelial rating were selected. Slit-lamp biomicroscopic examinations were also performed on all post-cut endothelial keratoplasty lenticules. Specular microscopy (KeratoAnalyzer EKA-10; Konan Medical Inc., Hyogo, Japan) was used to calculate endothelial cell density in corneoscleral buttons before microkeratome dissection and in all corneoscleral buttons- and fresh whole eyes-dissected endothelial keratoplasty lenticules 12–15h after dissection.

**Post-cut thickness measurements**

To obtain thickness profile of endothelial keratoplasty lenticular, post-cut tissue container was fixed on precalibrated Visante optical coherence tomography (Carl Zeiss Meditec, Inc., Dublin, CA, USA) by using a custom-designed mount\(^{[19]}\) and measurements of the endothelial keratoplasty lenticule were performed in two perpendicular meridians and at a median time interval of 14 h (range of 12h–16h) from the placement of tissue in Optisol GS. All measurements in each meridian were performed at five settings: the most central, two pericentral (3.21 mm diameter), and two peripheral (6.29 mm diameter) regions. Given that Visante optical coherence tomography measurements, in general, are not adjusted based on Optisol GS-cornea refractive index, to minimize these errors in the Visante optical coherence tomography system when measuring tissue thickness in Optisol GS medium, correction factors of ~2.2% and ~8.7% were calculated for the values obtained at the pericentral and midperipheral locations, respectively.\(^{[20]}\) As for dissection depths of CBm and SLc microkeratomes, over/under dissection values were calculated as the deduction of endothelial keratoplasty lenticules central thicknesses from the differences between pachymetry values and implemented microkeratome blades. After the transplantation of post-cut DSAEK tissues, postoperative reports were investigated in terms of rates of failed grafts, which were reported as a loss of graft clarity or nonattached endothelial keratoplasty lenticules.

**Statistical analysis**

SPSS software (IBM Corp. released 2013, IBM SPSS Statistics for Windows, Version 25.0. Armonk, NY: IBM Corp.) was selected to remove previous dissections for the statistical analysis. A dynamic p-value of 0.05 was considered significant.
used to perform statistical analyses. The thickness values of post-cut DSAEK tissues were presented as means and standard deviations and statistically compared between CBm and SLc groups in fresh whole eyes and between SLc and OUP groups in corneoscleral buttons using a generalized linear model and ANOVA test. T-test was used to compare over/under dissection values between CBm and SLc separately for fresh whole eyes and corneoscleral buttons. Correlation between the two eyes of each donor was investigated by using a generalized estimating equation. A $P$ value less than 0.05 was considered statistically significant.

**Results**

**SLc vs CBm-cut endothelial keratoplasty lenticules from fresh whole eyes**

Donor criteria, thickness profiles, and endothelial cell densities of prepared endothelial keratoplasty lenticules via CBm and SLc systems are shown in Table 1. Briefly, 69 fresh whole eyes from 43 donors were enrolled; 35 from 20 donors and 34 from 23 donors were dissected with SLc and CBm, respectively. The preparation of endothelial keratoplasty lenticules failed in two eyes (5.1%) in the SLc group due to incomplete pass/cut, and in one eye (2.9%) in the CBm group due to the occurrence of corneal perforation. The reason for incomplete pass/cuts in the SLc group was proved to be the unexpected eclipse of microkeratome turbines with debris material. There was no significant difference between SLc and CBm groups in terms of pre-dissection central corneal thickness ($P = 0.71$), central thickness of endothelial keratoplasty lenticules ($P = 0.734$), post-cut endothelial cell density ($P = 0.081$), numbers of ultrathin endothelial keratoplasty lenticules (of less than $<100 \mu m$ central thickness) ($P = 0.862$), and rate of failed graft ($P = 0.919$). As illustrated in Fig. 1, there was no significant difference between SLc and CBm groups in terms of the increase of endothelial keratoplasty lenticule thickness from the center toward the periphery ($P = 0.438$).

The anticipated dissection depths (central thicknesses of endothelial keratoplasty lenticules) for SLc agreed with the head labeling and the CBm heads dissected significantly deeper than the SLc heads ($P < 0.001$). The deviation from targeted $85 \mu m$ central thickness of endothelial keratoplasty lenticule did not differ significantly between the two systems ($P = 0.734$) [Table 2].

**Corneoscleral button-dissected endothelial keratoplasty lenticules via SLc vs OUP**

Table 3 illustrates donor criteria, endothelial cell densities, and thickness profiles of corneoscleral button-dissected endothelial keratoplasty lenticules with OUP and SLc systems. Briefly, 42 corneoscleral buttons from 31 donors were enrolled; 22 from 15 donors and 20 from 16 donors were dissected with SLc and OUP, respectively. The preparation failed in three eyes (13.6%) in the SLc group due to incomplete pass/cut and in one eye (5%) in the OUP group due to corneal perforation. There was no significant difference between SLc and OUP groups in terms of mean central thickness of endothelial keratoplasty lenticules ($P = 0.100$ and $P = 0.412$, respectively), numbers of ultrathin endothelial keratoplasty lenticules ($P = 0.288$), and rate of failed graft ($P = 0.555$). As shown in Fig. 2, no significant difference was observed between SLc and OUP groups in terms of mean central thickness of endothelial keratoplasty lenticules ($P = 0.234$) and increase of endothelial keratoplasty lenticule thickness from central towards peripheral regions ($P = 0.254$). Unlike OUP-dissected endothelial keratoplasty lenticules in which the mean increase of thickness was statistically different from central to two pericentral locations ($P = 0.001$), no significant difference was observed in the corresponding parts of SLc-dissected

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**Table 1: Donor criteria, endothelial cell density, and thickness profiles of the prepared endothelial keratoplasty lenticules from fresh donated whole eyes via Moria CBm versus Gebauer SLc system**

| Donor, cornea, and dissection specifications | CBm group | SLc group | $P$ |
|---------------------------------------------|-----------|-----------|-----|
| No. of donors                              | 23        | 20        | -   |
| No. of fresh whole eyes                    | 34        | 35        | -   |
| Donors’ age (mean±SD)                      | 20–59 (41.5±10.8) Yrs | 20–71 (44.1±13.5) Yrs | 0.379 |
| Donors’ sex                                | Male (95.6%) | Male (60%) | <0.001 |
| Mean CCT (range)                           | 669±84 $\mu m$ (488-796) | 677±82 $\mu m$ (498-915) | 0.710 |
| Failed preparation                         | 1 (2.9%)  | 2 (5.1%)  | 0.642 |
| Mean central thickness of endothelial keratoplasty lenticules | 128±24 $\mu m$ | 126±26 $\mu m$ | 0.734 |
| Mean increase of endothelial keratoplasty lenticule thickness from central to pericentral locations | $22.18±13.9 \mu m$ vs $21.91±21.41 \mu m$ ($P=0.951$) | $17.58±14.67 \mu m$ vs $16.15±9.69 \mu m$ ($P=0.589$) | 0.184 |
| Mean difference between 2 pericentral locations | $72.58±23.12 \mu m$ vs $61.88±28.78 \mu m$ ($P=0.101$) | $66.94±27.02 \mu m$ vs $59.06±25.94 \mu m$ ($P=0.303$) | 0.355 |
| Mean ECD                                   | 2817±238 cell/mm² | 2723±190 cell/mm² | 0.081 |
| Mean increase of endothelial keratoplasty lenticule thickness from central to peripheral locations | $17.36±18.29 \mu m$ | $11.36±9.69 \mu m$ | 0.091 |
| Mean difference between 2 peripheral locations | $31.73±20.19 \mu m$ | $35.94±24.46 \mu m$ | 0.438 |
| Mean ECD                                   | 32 of 37 (86.5%) | 32 of 37 (86.5%) | <0.0001 |

CCT: Central corneal thickness; ECD: Endothelial cell density
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Albeit that means of an increase in endothelial keratoplasty lenticules thicknesses from central to two peripheral locations in the SLc group were considerably different ($P = 0.011$), such a difference was not observed in corresponding parts of OUP-dissected endothelial keratoplasty lenticules ($P = 0.734$).

Both SLc and OUP systems showed a significant reduction of endothelial cell density after the dissection as compared to the pre-dissection values ($P = 0.004$ for SLc and $P = 0.003$ for OUP). The means of endothelial cell density 12–15h after the dissection decreased by an average of 12.1% (range of 10.2–12.7%) in the SLc and 9.2% (range of 8.6–11%) in the OUP group; however, the reduction rate was not significantly different between two groups ($P = 0.490$). As demonstrated in Table 4, the anticipated cut depths (central thicknesses of endothelial keratoplasty lenticules) for SLc agreed with the head labeling, and the OUP heads dissected significantly deeper than the Gebauer SLc heads ($P < 0.001$). The deviation from targeted 85µm central thickness of endothelial keratoplasty lenticule did not differ significantly between the systems ($P = 0.734$).

### Discussion

The current study, unlike Fuest et al.\[11\] that compared endothelial keratoplasty lenticule preparation from
corneoscleral buttons between hand-guided CBm and fully automatic SLc microkeratome, investigated the thickness profiles of endothelial keratoplasty lenticules dissected from fresh whole eyes with CBm as compared to those dissected with SLc system and demonstrated comparable results between the two systems in terms of mean central corneal thickness and mean increase of thickness toward the periphery. Moreover, the present study showed comparable results for the thickness profiles of endothelial keratoplasty lenticules prepared from corneoscleral buttons between those dissected with SLc and those dissected with the OUP system. In our study, the thickness of SLc-dissected endothelial keratoplasty lenticules,

### Table 3: Donor criteria, endothelial cell density, and thickness profiles of the prepared endothelial keratoplasty lenticules from excised corneoscleral buttons via Moria OUP versus Gebauer SLc system

| Donor, cornea, and dissection specifications | OUP group | SLc group | P   |
|--------------------------------------------|-----------|-----------|-----|
| No. of donors                              | 16        | 15        | -   |
| No. of corneoscleral buttons               | 20        | 22        | -   |
| Donors’ age                                | 20-65 (44.4±18.8) Yrs | 17-72 (47.9±20.2) Yrs | 0.533 |
| Range (mean±SD)                            |           |           |     |
| Donors’ sex                                | Male (75%) | Male (86.7%) | 0.481 |
| Mean CCT (range)                           | 570±58 µm (450–650) | 593±50 µm (495–670) | 0.177 |
| Failed preparation                         | 1 (5.0%)  | 3 (13.6%) | 0.359 |
| Mean central thickness of endothelial keratoplasty lenticules | 112±27 µm | 123±30 µm | 0.234 |
| Mean increase of endothelial keratoplasty lenticule thickness from central to pericentral locations | 13.11±13.22 µm vs 29.37±16.66 µm | 29.47±21.89 µm vs 20.68±12.62 µm | 0.063 |
| Mean difference between two pericentral locations | 19.63±13.66 µm | 17.21±17.99 µm | 0.631 |
| Mean difference between two peripheral locations | 37.21±29.46 µm | 49.68±39.13 µm | 0.254 |
| Pre-dissection mean ECD                    | 2786±262 cell/mm² | 2966±385 cell/mm² | 0.100 |
| Post-dissection mean ECD                   | 2606±330 cell/mm² | 2531±220 cell/mm² | 0.412 |
| Post-dissection ECL                        | 12.1% (range of 10.2%-12.7%) | 9.2% (range of 8.6%-11%) | 0.490 |
| agreement between the endothelial keratoplasty lenticule thickness and head labeling | 5 of 19 (26.3%) | 17 of 19 (89.4%) | <0.0005 |
| Ultrathin endothelial keratoplasty lenticule | 7 (36.8%) | 4 (21.0%) | 0.288 |
| Failed graft                               | 2 (10.5%) | 1 (5.3%) | 0.555 |

CCT: Central corneal thickness, ECD: Endothelial cell density, ECL: Endothelial cell loss, OUP: One‑Use Plus

### Table 4: Endothelial keratoplasty lenticule preparation with the Gebauer SLc and Moria OUP

| System | Head | N   | CCT (µm) | Central Thickness (µm) of Endothelial Keratoplasty Lenticule | Deviation 85 | Over (-)/Under (+) |
|--------|------|-----|----------|-------------------------------------------------------------|-------------|---------------------|
| SLC    | 550  | 5   | 658±11   | 112±19                                                      | 26.8±18.83 | +4±20.58            |
|        | 525  | 1   | 652      | 82                                                        | -3          | -45                 |
|        | 475  | 3   | 596±7    | 94±12                                                      | 8.67±12.1  | -27.33±6.81         |
|        | 4501 | 3   | 575±6    | 156±37                                                     | 70.67±36.53| +30.67±41.4         |
|        | 425  | 6   | 553±9    | 129±7                                                      | 44.17±7.44 | +1.17±12.81         |
|        | 3502 | 1   | 495      | 182                                                       | 97          | +37                 |
| Total  |      | 19  |          |                                                             |             |                     |
| OUP    | 450 (1) | 7 | 631±12   | 90±22                                                      | 4.86±21.62 | -91.14±27.13        |
|        | 400  | 2   | 580±14   | 98±21                                                      | 13±21.21   | -82±35.36           |
|        | 350 (2) | 6 | 533±20   | 123±15                                                     | 37.5±14.92 | -60.33±10.69        |
|        | 300  | 4   | 513±59   | 143±16                                                     | 57.75±16.4 | -70.25±65.61        |
| Total  |      | 19  |          |                                                             |             |                     |
| P-value |      |     |          |                                                             | 0.234       | <0.001              |

Means of central corneal thickness (CCT) before preparation (measured via pachymetry), central thickness of endothelial keratoplasty lenticule, number of corneoscleral button dissections per Gebauer SLc and Moria OUP head (N), over/under dissection values, and deviation of central endothelial keratoplasty lenticule thickness from the targeted 85 µm (Dev 85). For the Gebauer SLc heads, all the implemented heads cut significantly deeper than the according Gebauer SLc counterparts (450 heads, P=0.001; 350 heads, P=0.001). The deviation from targeted 85 µm central thickness of endothelial keratoplasty lenticule did not differ significantly between the systems (P=0.234).
whether from fresh whole eyes or corneoscleral buttons, had a very good agreement with the cutting head description. However, the dissection depths in both CBm and OUP systems were substantially deeper than the head descriptions. These results were similar to those reported by Fuest et al.\textsuperscript{[11,12]} except that the endothelial keratoplasty lenticules in their series were dissected only from corneoscleral buttons, not from fresh whole eyes. The superiority of the SLc system over OUP in this regard may be due to the use of a transparent visual applanation plate in SLc for setting the desired cutting diameter.

In the current study, although there was a symmetric increase of thickness toward the periphery in endothelial keratoplasty lenticules dissected from fresh whole eyes with both CBm and SLc systems, this increase was partially asymmetric for endothelial keratoplasty lenticules that were prepared from corneoscleral buttons with both SLc and OUP systems. Nevertheless, given the low rates of postoperative failed grafts in all study groups, it does not seem that this asymmetry in endothelial keratoplasty lenticules contours would have had a significant effect on the detachment rate of grafted lenticules. These variations in endothelial keratoplasty lenticules thickness profiles were expected to occur due to donor tissue-related factors\textsuperscript{[16]} plus inherent errors associated with preparation technique, especially in manual dissection.\textsuperscript{[19]} However, the Visante optical coherence tomography measurements of endothelial keratoplasty lenticules in the current study showed that the variations of thickness profiles were more significant with automated dissection of corneoscleral buttons than with manual cutting of fresh whole eyes. This can be partly due to the higher experience of our eye bank technician (T. Ch) on the preparation of endothelial keratoplasty lenticules from fresh whole eyes as compared to her experience on automatic preparation of endothelial keratoplasty lenticules from corneoscleral buttons.\textsuperscript{[16]} Therefore, obtaining endothelial keratoplasty lenticules of uniform contours from corneoscleral buttons with hands-free microkeratomes is expected to occur over time. As for donor-related factors in the current study, there was no significant difference between fresh whole eyes- and corneoscleral buttons-dissected endothelial keratoplasty lenticules in terms of donors’ age, and intracameral pressure was attempted to be constant during the dissection process for all the implemented systems.

The results of our study revealed no significant difference in the rate of fresh whole eyes-dissected ultrathin endothelial keratoplasty lenticules between CBm and SLc groups. The rate of corneoscleral buttons-dissected ultrathin endothelial keratoplasty lenticules was also not significantly different between OUP and SLc groups. This means that both hand-guided and hands-free systems with no significant variability can reliably be used for the preparation of ultrathin endothelial keratoplasty lenticules via a single pass technique.

Our results in terms of endothelial cell loss after dissection of corneoscleral buttons with SLc (121%) or OUP (9.2%) were similar to the reported rate of 11% in a study by Rose et al.\textsuperscript{[21]} In preparation of pre-dissected endothelial keratoplasty lenticules from corneoscleral buttons, due to implementation of an anterior chamber and direct contact of corneal endothelium with fluid flow,\textsuperscript{[22‑25]} it is expected to observe more endothelial cell loss than when endothelial keratoplasty lenticules are dissected from fresh whole eyes in which the anterior chamber of the whole eye supports the dissection and induces less endothelial manipulation.\textsuperscript{[19]}

Our study as a preoperative eye bank investigation had drawbacks in terms of lack of specular microscopic data on endothelial cell densities in fresh whole eyes prior to the dissection. Performing specular microscopy with its particular setting specialized for excised corneas was not possible for fresh whole eyes. Furthermore, posttransplantation specular microscopy either was not performed or the corresponding data were not available in the current study.

**Conclusion**

Our study demonstrated that the thickness profiles of fresh whole eyes-dissected endothelial keratoplasty lenticules with automatic SLc were comparable with those of manual CBm system, showing a symmetric increase of thickness towards the periphery. In corneoscleral button-dissected endothelial keratoplasty lenticules with both SLc and OUP systems, although an opportunity of the user-independent cut was provided, the increase of thickness toward the pericentral and peripheral areas was partially asymmetric. Unlike CBm and OUP systems in which the dissection depths were substantially deeper than the head labeling, thickness of SLc-dissected endothelial keratoplasty lenticules, whether from fresh whole eyes or corneoscleral buttons, showed a good agreement with the head descriptions; indicating that SLc system may be a good candidate for those eye bank technicians or surgeons that are on learning curve for endothelial keratoplasty lenticule preparation. Furthermore, considering the potential risk of endothelial cell loss after the dissection of corneoscleral buttons with both SLc and OUP systems, preparation of pre-dissected endothelial keratoplasty lenticules from fresh whole eyes whether with SLc or with CBm is preferred in the eye banks that harvest donated whole eyes.

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**Conflicts of interest**

There are no conflicts of interest.

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