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Standardization of the Descemet membrane endothelial keratoplasty technique: Outcomes of the first 450 consecutive cases☆

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ABSTRACT

Objectives: To evaluate the clinical outcome of the first 450 consecutive cases after Descemet membrane endothelial keratoplasty (DMEK), as well as the effect of standardization of the technique.

Material and methods: Comparison between 3 groups: Group I: (cases 1–125), as the extended learning curve; Group II: (cases 126–250), transition to technique standardization; Group III: (cases 251–450), surgery with standardized technique. Best corrected visual acuity, endothelial cell density, pachymetry and intra- and postoperative complications were evaluated before, and 1, 3 and 6 months after DMEK.

Results: At 6 months after surgery, 79% of eyes reached a best corrected visual acuity of ≥0.8 and 43% ≥1.0. Mean preoperative endothelial cell density was 2530 ± 220 cells/mm^2 and 1613 ± 495 at 6 months after surgery. Mean pachymetry measured 668 ± 92 μm and 526 ± 46 μm pre- and (6 months) post-operatively, respectively. There were no significant differences in best corrected visual acuity, endothelial cell density and pachymetry between the 3 groups ($p > 0.05$). Graft detachment presented in 17.3% of the eyes. The detachment rate declined from 24% to 12%, and the rate of secondary surgeries from 9.6% to 3.5%, from group I to III respectively.

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Conclusions: Visual outcomes and endothelial cell density after DMEK are independent of the technique standardization. However, technique standardization may have contributed to a lower graft detachment rate and a relatively low number of secondary interventions required. As such, DMEK may become the first choice of treatment in corneal endothelial disease.

La estandarización en el trasplante endotelial de membrana de Descemet: resultados de las primeras 450 cirugías

Palabras clave:
Trasplante endotelial con membrana de Descemet
Distrofia endotelial de Fuchs
Queratopatía bullosa
Trasplante endotelial
Curva de aprendizaje

RESUMEN

Objetivos: Analizar los resultados de 450 casos con diferentes patologías endoteliales intervenidos mediante trasplante endotelial con la técnica de recambio de la membrana de Descemet (DMEK, por sus siglas en inglés: *Descemet membrane endothelial keratoplasty*) y evaluar las consecuencias de la estandarización de esta técnica.

Material y métodos: Se compararon 3 subgrupos consecutivos: el subgrupo I (casos 1-125) representaba la extensión de la curva de aprendizaje; el subgrupo II (casos 126-250) la transición a la estandarización de la técnica y el subgrupo III (casos 251-450) la estandarización propiamente dicha. Se registraron los resultados de agudeza visual mejor corregida pre- y postoperatorios, la densidad de células endoteliales, la paquimetría y las complicaciones.

Resultados: A los 6 meses de la cirugía, el 79% de los pacientes alcanzaron una agudeza visual mejor corregida $\geq 0{,}8$ y el 43% ≥ 1. La densidad de células endoteliales media preoperatoria fue 2.530 ± 220 células/mm^2, y 1.613 ± 495 células/mm^2 al sexto mes poscirugía. La paquimetría era 668 ± 92 μm y 526 ± 46 μm pre- y postoperatoria a los 6 meses, respectivamente. No se encontraron diferencias en cuanto a la agudeza visual mejor corregida, la densidad de células endoteliales o la paquimetría entre los subgrupos ($p > 0{,}05$). El desprendimiento del injerto se observó en el 17,3% de los ojos. La tasa de desprendimientos disminuyó del 24 al 12%, y el número de reintervenciones, del 9,6 al 3,5%, del subgrupo I al III respectivamente.

Conclusiones: Los resultados visuales y la densidad de células endoteliales tras DMEK son independientes de la estandarización de la técnica quirúrgica. Sin embargo, la estandarización de la técnica podría haber contribuido con un descenso en el número de desprendimientos y con un relativamente bajo número de intervenciones secundarias. A la vista de estos resultados, DMEK podría convertirse en el tratamiento de elección para las enfermedades del endotelio corneal.

Introduction

Since the introduction in 1998 of posterior lamellar keratoplasty (PLK),[1,2] also known as Deep Lamellar Endothelial Keratoplasty (DLEK),[3–5] this technique has been developed and modified to become the most commonly used technique at present: DS(A)EK [Descemet Stripping (Automated) Endothelial Keratoplasty][6–8] and DMEK (Descemet Membrane Endothelial Keratoplasty).[9] These 2 posterior lamellar techniques not only provide better visual results when compared with penetrating keratoplasty (PK) and DLEK, but also avoid the complications derived from sutures or the elevated residual astigmatism frequently observed after PK.[10]

Even though DS(A)EK generally obtains acceptable visual results (generally better than after PK or DLEK), this technique modifies the physiological anatomy of the cornea due to the fact that, together with donor Descemet's membrane (DM) and endothelium, the transplant also includes a stroma sheet. In other words, a posterior corneal lamella which is thicker than the physiological lamella is transplanted. This could induce optical imperfections, with the result that few patients could achieve best corrected visual acuity (BCVA) values of 1 (≥20/20, ≥1 in the Snellen scale).[10–13] The introduction of the DMEK technique in 2002 signified an evolution of endothelial transplants as it enabled selectively transplanting the endothelium and DM[9,14] without additional stroma insertion. Accordingly, DMEK is a "non-additive" surgery which restores physiological corneal anatomy. This translates into excellent visual results which were inconceivable with previous keratoplasty techniques.[15–18]

Even though DMEK was initially regarded as more complicated to perform than DS(A)EK, the latest developments in tissue preparation and surgical technique standardization