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Original article

Corneal transplantation in keratoconus: Penetrating keratoplasty versus deep anterior lamellar keratoplasty with Melles technique[☆]



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ARTICLE INFO

Article history:

Received 5 February 2014

Accepted 30 July 2014

Available online 5 March 2015

Keywords:

Keratoconus

Deep anterior lamellar keratoplasty

Melles technique

Penetrating keratoplasty

ABSTRACT

Objectives: To evaluate the effectiveness of deep anterior lamellar keratoplasty (DALK) using Melles technique (technique B) in patients with advanced keratoconus versus a classic technique, penetrating keratoplasty (technique A).

Methodology: Retrospective descriptive comparative study between technique A and technique B in homogeneous groups.

Results: Best corrected visual acuity (Snellen test decimal scale) was 0.77 ± 0.32 for group A and 0.62 ± 0.29 for group B, with no statistically significant differences. The mean spherical final refraction in group A was 1.73 ± 5.1 diopters, and the mean spherical equivalent was -3.92 ± 5.1 . Technique B group gave values -2.67 ± 4.02 diopters and -4.55 ± 4.08 diopters, respectively, with no statistically significant differences. The residual cylinder after removal of the sutures was 4.47 ± 2.47 diopters for group A and 3.77 ± 1.63 for group B, with no statistically significant differences.

Conclusion: No statistically significant differences were found for any of the studied variables when comparing both groups using the t-test for independent samples. More studies on the homogeneity and residual stromal bed thickness could provide the key to determine whether this technique is closer to the visual acuity of penetrating keratoplasty or DALK by a descemet technique.

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[☆] Please cite this article as: Cano-Ortiz A, Villarrubia A. Trasplante de córnea en queratocono: queratoplastia penetrante versus queratoplastia lamelar anterior profunda con técnica de Melles. Arch Soc Esp Oftalmol. 2015;90:4-8.

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Trasplante de córnea en queratocono: queratoplastia penetrante versus queratoplastia lamelar anterior profunda con técnica de Melles

R E S U M E N

Palabras clave:

Queratocono
Queratoplastia lamelar anterior profunda
Técnica de Melles
Queratoplastia penetrante

Objetivos: Evaluar la eficacia de la queratoplastia lamelar anterior profunda (DALK) mediante técnica de Melles (técnica B) en pacientes con queratocono avanzado en comparación con la técnica clásica de queratoplastia penetrante (QPP) (técnica A).

Metodología: Estudio retrospectivo descriptivo comparativo entre la técnica A y la técnica B en grupos homogéneos.

Resultados: La agudeza visual con corrección (test de Snellen, escala decimal) ha sido de $0,77 \pm 0,32$ para el grupo A y de $0,62 \pm 0,29$ para el grupo B, no siendo diferencias estadísticamente significativas. El defecto refractivo esférico medio en el grupo A fue de $-1,73 \pm 5,1$ dioptrías y el equivalente esférico medio de $-3,92 \pm 5,1$ dioptrías. El grupo B presentó valores de $-2,67 \pm 4,02$ dioptrías y $-4,55 \pm 4,08$ dioptrías, respectivamente, no habiendo diferencias para estas variables en ambos grupos. El cilindro residual una vez retiradas las suturas fue de $4,47 \pm 2,47$ dioptrías para el grupo A y de $3,77 \pm 1,63$ dioptrías para el grupo B, sin ser estadísticamente significativas.

Conclusión: No se han encontrado diferencias estadísticamente significativas para ninguna de las variables estudiadas al comparar ambos grupos mediante la t de Student para muestras independientes. Más estudios acerca de la homogeneidad del lecho estromal residual y del espesor del mismo pueden aportar las claves para que esta técnica se acerque a las agudezas visuales de una QPP o una DALK mediante técnica descemética.

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Introduction

Keratoconus is a non-inflammatory disease which involves ectasia, expressing in its early stages by means of changes in patient refraction.^{1,2} In some cases, vision can be improved with spectacles, in other cases contact lenses and in a high number of cases it is necessary to apply surgery to improve the quality or quantity of vision. In early stages of the disease, intra-corneal rings have been implanted to improve visual acuity as well as to stabilize the cone.^{3,4} This technique has also been used in advanced keratoconus with optimum results.⁵ Accordingly, during the progression of corneal ectasia in this pathology, it has been demonstrated that corneal collagen cross-linking can be effective.^{6,7}

When none of the alternatives mentioned above are effective or there is no indication because the disease is at very advanced stages, the solution is corneal transplant. For many years, the surgical treatment of choice in advanced keratoconus has been penetrating keratoplasty (PK). Between the decade of the seventies and nineties, some authors performed epikeratophakia but this intervention was subsequently abandoned due to poor results as the non-homogeneous surface generated irregular astigmatism which did not produce satisfactory visual acuity.⁸ Later on, deep anterior lamellar keratoplasty (DALK) was introduced as an alternative to PK with the idea of maintaining the receptor endothelium.⁹

Various techniques have been used to maintain the receptor endothelium: manual dissection, hydrodissection, viscodissection or air dissection (big-bubble).⁹⁻¹¹ This study

compares PK with DALK by means of the manual dissection technique known as the Melles technique.

Material and methods

This retrospective study included patients intervened between 2002 and 2011 with keratoplasty (penetrating or deep anterior lamellar with the Melles technique) in the Arruzafa hospital in Córdoba for advanced keratoconus not susceptible to other techniques for improving their corneal pathology. The study complied with the principles of the Helsinki declaration. In all cases, the minimum follow-up period exceeded one year, and the refractive and visual acuity analysis were carried out after removing all the sutures. On the basis of these criteria, 41 eyes of 36 patients were included in the study, 20 eyes underwent PK and 21 DALK using the Melles technique.

Group A comprised 20 eyes with advanced keratoconus which underwent PK, of which 12 were performed due to failure in achieving a big bubble and requiring a switch to penetrating surgery. Group B comprised 21 eyes which underwent DALK using the Melles technique. Two eyes of group A and 3 eyes of group B were lost during the follow-up. The groups were homogeneous in what concerns age, sex and follow-up time (Table 1).

The penetrating technique was performed marking the center of the cornea and removing the complete thickness thereof with a Hessburg-Barron trepan (Katena Products, Inc., Denville, United Kingdom), completing a 360° keratotomy using corneal scissors. A 8.5 mm trepan was utilized in all

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