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Original article

Comparative study of keratoconus between Anwar's deep anterior lamellar keratoplasty versus converted penetrating keratoplasty[☆]



R. Donoso^{a,*}, C. Díaz^b, P. Villavicencio^b

^a Clínica Oftalmológica Pasteur, Santiago, Chile

^b Hospital Salvador, Universidad de Chile, Santiago, Chile

ARTICLE INFO

Article history:

Received 1 May 2013

Accepted 3 November 2014

Available online 9 July 2015

Keywords:

Penetrating keratoplasty

Deep anterior lamellar keratoplasty

Keratoconus

Big Bubble

Conversion

ABSTRACT

Objective: To compare outcomes between penetrating keratoplasty (PK) and deep anterior lamellar keratoplasty (DALK) in patients with keratoconus.

Design: Retrospective cohort study.

Methods: Data of 90 DALK and 49 procedures from conversion to PK, performed by a single surgeon (R.D.) from 2006 to 2011 were analyzed. Outcomes on corrected distance visual acuity (BCVA), astigmatism, time to first refraction, pachymetry, endothelial count cell, and postoperative complications were compared between these groups.

Results: The mean age of the patients who underwent DALK and PK was 28.2 and 31.7 years, respectively ($P = .17$). The mean follow up for DALK and for the PK group was 14.7 and 19.4 months, respectively ($P = .13$). There was no significant difference between PK and DALK groups in the mean postoperative for: BCVA (LogMAR) (0.17 vs. 0.17; $P = .59$); refractive astigmatism (-3.19 vs. -3.01 diopters; $P = .65$), and time for the first subjective refraction (60.5 versus 68 days; $P = .50$). Main postoperative complications were 8% of endothelial rejection in PK group and 10% of deep stromal vascularization in DALK group.

Conclusions: The only differences in postoperative results between groups were stromal neovascularization in DALK group and endothelial rejection in PK group. DALK should be considered as the first option when keratoplasty is indicated in keratoconus.

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[☆] Please cite this article as: Donoso R, Díaz C, Villavicencio P. Estudio comparativo en queratoplastia para queratocono entre las técnicas lamelar profunda de Anwar (*big bubble*) y penetrante procedente de conversión. Arch Soc Esp Oftalmol. 2015;90:257-263.

* Corresponding author.

E-mail address: rdonoso@pasteur.cl (R. Donoso).

Estudio comparativo en queratoplastia para queratocono entre las técnicas lamelar profunda de Anwar (*big bubble*) y penetrante procedente de conversión

R E S U M E N

Palabras clave:

Queratoplastia penetrante
Queratoplastia lamelar anterior profunda
Queratocono
Gran burbuja
Conversión

Objetivo: El propósito de este grupo de estudio fue comparar los resultados entre los procedimientos de queratoplastia lamelar profunda anterior (deep anterior lamellar keratoplasty [DALK]) y queratoplastia penetrante (penetrating keratoplasty [PK]) en pacientes con queratocono.

Diseño: Estudio de cohorte retrospectivo.

Método: Se analizaron los resultados de 90 DALK y 49 PK procedentes de reconversión en pacientes con queratocono. Todos los procedimientos fueron realizados por el mismo cirujano (R.D.) desde 2006 hasta 2011. Entre ambos grupos se comparó la agudeza visual a distancia corregida (AVCC), el astigmatismo, el tiempo de la primera refracción, la paquimetría, el recuento de células endoteliales y las complicaciones postoperatorias.

Resultados: La media de edad fue de 28,2 años para DALK y de 31,7 años para PK ($p=0,17$). El seguimiento medio fue de 14,7 meses para DALK y 19,4 meses para PK ($p=0,13$). No hubo diferencia significativa alguna entre los grupos de PK y DALK en la media postoperatoria de AVCC (LogMAR) (0,17 frente a 0,17; $p=0,59$), astigmatismo refractivo (-3,19 frente a -3,01 dioptrías; $p=0,65$) ni en el tiempo de la primera refracción subjetiva (60,5 frente a 68 días; $p=0,50$). Las principales complicaciones postoperatorias fueron 8% de rechazo endotelial en el grupo PK y 10% de vascularización de la interfaz en el grupo DALK.

Conclusiones: La única diferencia entre ambos grupos fue la neovascularización estromal profunda en DALK y el rechazo endotelial en PK, por lo que el procedimiento DALK debe ser considerado como primera opción en el tratamiento de pacientes con queratocono.

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Introduction

In the last decade, penetrating keratoplasty (PK) has been the surgical treatment of choice for keratocone. The drawbacks of this procedure include prolonged visual rehabilitation, high astigmatism, suture-related complications, wound dehiscence and graft rejection.¹⁻⁵ On the other hand, with repeated PK procedures, graft survival rates diminished significantly at 5 and 10 years compared to baseline PK. In addition, the visual result is frequently poorer than that of the primary graft.⁶

Even though PK is still the most commonly applied keratoplasty procedure for treating keratocone, recent studies comparing PK with the lamellar procedure suggested that deep anterior lamellar keratoplasty (DALK) should be the first choice of treatment.⁷

New deep lamellar dissection techniques have been introduced in recent years.⁸⁻¹¹ In these techniques, the stroma is withdrawn as deeply as possible, denuding Descemet's membrane and endothelium, as in Anwar's successful «big bubble» technique.¹⁰

DALK has the advantage of preserving the receiving endothelium, thus avoiding endothelial rejection due to immune response as well as complications associated to the use of steroids for prevention and treatment.¹² This technique avoids or minimizes complications related to intraocular procedures such as expulsive hemorrhage, endophthalmitis, anterior peripheral synechiae and angle closure secondary

to glaucoma.⁹ There is increased evidence that DALK could be a safer alternative to PK even without demonstrating better visual results^{13,14} when executed adequately with deep dissection.¹⁵ Finally, DALK would be more useful for preserving ocular structural integrity in the presence of trauma.^{16,17}

In addition, some authors have stated that the growing use of the lamellar technique could be beneficial in the long term, with cost savings due to the lower frequency of re-interventions and those related to the management of rejection, postoperative and intraocular complications. Said technique would be also beneficial because it increases the availability of donor corneal tissue.^{18,19} The main drawback of DALK is its long learning curve as it is a longer and technically more demanding procedure.^{1,20}

As keratocone occurs in patients free of other ocular diseases and is the most common indication for DALK and PK (derived from reconversion) in the same type of corneal condition, we believe it is the perfect situation for comparing the results of both techniques. On the other hand, considering that Reinhart et al., in their paper on DALK at the 2011 American Academy of Ophthalmology⁷ identified only 11 studies which directly compared postoperative results between DALK and PK, and indicated that all except one were level III studies and that only 7 of these included patients with keratocone but with a smaller number of cases and follow-up than the present study, the authors decided to carry out an evaluation and to report their experience with the surgical treatment for keratocone.

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