

Anterior lamellar keratoplasty using gamma-irradiated corneal graft. An innovative approach regarding ALK

Andrej Černák, M.D., DrSc. Konstantinos Kakoulidis M.D., PhD,
Martin Černák M.D., PhD

Ophthalmology Clinic, Slovak Medical University in Bratislava, Slovakia

Keywords

*anterior lamellar
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Abstract

Aim: To evaluate the utility and the efficacy of gamma-irradiated corneal allografts.

To report the clinical outcomes of lamellar keratoplasty using sterile, gamma-irradiated corneal tissues (Vision Graft) for partial-thickness corneal defects.

Setting/Venue: Ophthalmology Clinic, Slovak Medical University in Bratislava, Slovakia.

Methods: A patient with a hazy cornea was operated at the St. Cyril & Methods University Eye Hospital. Indication for surgery was superficial keratitis with intense neovascularization of the cornea. A full moon graft with thickness 300 microns, disposable trephine with 9 millimeters diameter and a circular non interrupted 10/0 nylon suture was used to secure the graft. Rate of epithelialization, neovascularization and clarity of the graft at the last visit were assessed retrospectively.

Results: The epithelialization of the graft was achieved 6 days after the operation. The donor tissue remained clear over a period of 6 months. No immune rejection, infection, significant opacification, of the donor tissues were noted during a follow-up period. A slight neovascularization were noted in between the irradiated graft and the stroma of the recipient without any further progression. The visual acuity before the operation was hand movement, immediately after was 0.5 and 6 months after was 0.4 and 1 year after surgery 0.2.

Conclusion: Irradiated Corneal Grafts may be considered as an alternative solution of fresh donor corneas for lamellar corneal patch grafts because of their affectivity, availability, easy handling, and lack of immunogenicity - neovascularization.

Corresponding author: Dr. Andrej Černák

Address of Authors: Ophthalmic Department, Slovak Medical University, Antolska 11, 85 107 Bratislava, Slovakia

E-mail: andrej.cernak@pe.unb.sk

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Introduction

Corneal transplantation, also known as corneal grafting, is one of the oldest, most common, and most successful form of solid tissue transplantation. In 2010, over 42,000 corneal transplantations were performed in the United States alone.¹ Despite advances in recognition and treatment, immune rejection remains the leading cause of corneal transplantation failure.² According to the World Health Organization, corneal blindness accounts for nearly 8 million of the 39 million cases of blindness worldwide.^{3,4}

Corneal transplantation is a sight-saving procedure with the potential to benefit many of those who suffer from corneal blindness; unfortunately, it has been estimated that only 100,000 corneal transplantations are performed per year worldwide.⁵ The availability of corneal transplantation is limited in part by the shortage of donated corneas, exclusion of corneas not fit for transplantation, and relatively short shelf-life of transplantation-suitable corneas.

The problem can be partly solved by using gamma irradiated corneas. TBI (Tissue Banks International-Baltimore) uses specialized procedures for the procurement, screening, gamma irradiation, and preservation of donor corneas to produce Vision-Graf Sterile Cornea. Gamma irradiated cornea has no cells and graft rejection is reduced.

Materials and Methods

A 76 years old lady come to our Ophthalmic Department of Slovak Medical University with diagnosis of superficial keratitis on both eyes since 1994 (Fig. 1). On her right eye in 2003 unsuccessfully penetrating keratoplasty was performed. Visual acuity on her right eye was light perception, on left eye hand movement. Due to intense neovascularisation success for corneal graft was very poor, gamma irradiated cornea was used. A full moon graft with 9 mm of diameter and

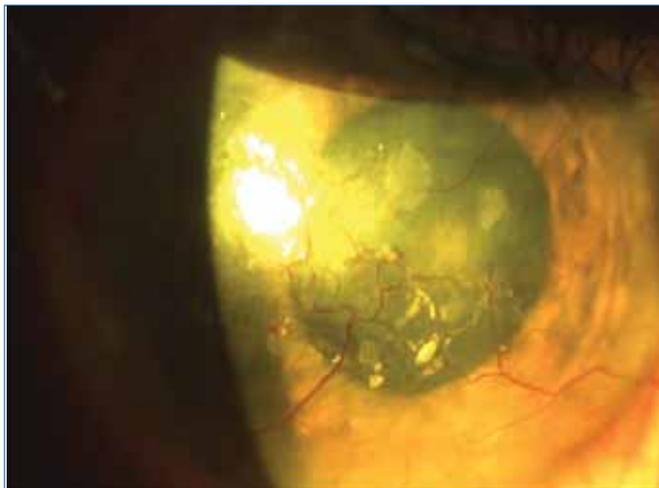


Figure 1. Slit-lamp imaging one week before the transplantation



Figure 2. Imaging three months after the operation

300 microns of thickness was used. On recipient eye corneal lamella of 8,5 mm of diameter a 300 microns of thickness was cut and graft was secure with a circular non interrupted 10/0 nylon suture (Fig. 2).

Results

The epithelisation of the graft was achieved 6 days after operation. The donor tissue remained clear in period 6 months (Fig. 3). Visual acuity improved from hand movement to 0.5 in 3 months (Fig. 2) after operation, 0.4 in 6 months and 0.2 one year after operation. After one year the surface of graft in the center started to be little hazy due to very poor tears production. At 6 months after surgery new vessels were noted, but not in the graft only between graft and stroma of recipient. During next follow up patient the vascularization was same all the time.

Discussion

Gamma irradiated cornea may be considered as an alternative solution of fresh donor corneas for lamellar



Figure 2. Imaging three months after the operation

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grafts. Irradiated cornea has specific characteristic. Because has no cells, there is no immune rejection. Stroma has normal collagen structure, is transparent and has same thickness as the fresh cornea. The cornea can be stored at room temperature for two years and also is no risk of transmission diseases from donor to recipient. Indication of irradiated corneas can be used in variety of clinical procedure:

- anterior lamellar keratoplasty
- tectonic keratoplasty, in urgent cases when fresh cornea is not available
- glaucoma patch grafting
- before keratoprosthesis when donor cornea is melted
- chemical burns.

Conclusion

Gamma irradiated cornea grafts may be considered as an alternative solution of fresh donor corneas for lamellar corneal patch grafts because of their affectivity, availability, easy handling and lack of immunogenicity and neovascularization.

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