

Half-top-hat penetrating keratoplasty

A thesis

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Abstract

we assessed healing of the wound using ultrasound biomicroscopy which proved to be efficient in helping us to decide timing of sutures removal, keeping in mind the drawback of being a contact method causing patient discomfort and being non suitable in early postoperative period. Another drawback is lower resolution when compared to AS-OCT- that may result in missing minimal pathological changes in graft, graft-host junction or anterior chamber angle.

Key word

Keratoplasty

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List of abbreviations

- AC-IOL: Anterior chamber IOL.
- AS-OCT: Anterior segment optical coherence tomography .
- BCVA: Best corrected visual acuity.
- CAIs: Carbonic anhydrase inhibitors.
- CCT: Central corneal thickness.
- CHED : Congenital hereditary endothelial dystrophy.
- DALK: Deep anterior lamellar keratoplasty.
- D.M. : Descemet membrane.
- D: Diopters.
- FED: Fuchs endothelial dystrophy.
- FS: Femtosecond.
- HOA: High-order aberrations.
- HSV: Herpes simplex virus.
- HTH: Half-top-hat .
- IOL: Intraocular lens.
- IOP: Intraocular pressure.
- IMSC: Immature senile cataract.
- Laser: Light amplification by stimulated emission of radiation.

- LASIK: Laser insitu keratomileusis.
- MRA: Manifest refraction astigmatism.
- MK medium: McCarey Kaufmann medium.
- MHz: Mega Hertz.
- nm: Nanometer.
- OVD: Ophthalmic viscosurgical device.
- PAS: Peripheral anterior synechia.
- PBK: Pseudophakic bullous keratopathy.
- PKP : Penetrating keratoplasty.
- TH PK: Top-hat penetrating keratoplasty.
- UBM : Ultrasound biomicroscopy .
- U-PACH : Ultrasound pachymetry .
- μ : microns.

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Introduction

Regular penetrating keratoplasty (PKP) requires relatively tight sutures to hold the edges together until the healing is sufficient to withstand the effect of the intraocular pressure; this usually takes about 1 year. During this year, refraction is not stable, and astigmatism (often of the irregular type) cannot be adequately corrected in many patients as long as the sutures are present (1, 2, 3). In addition, when the sutures are removed, substantial changes in refraction are frequently seen, possibly resulting in anisometropia and/or high-degree astigmatism (4, 5). Finally, wound dehiscence occurs after suture removal in up to 4% of cases, even if this is done more than 1 year after surgery (6).

Top-hat PKP combines many of the advantages of PKP and lamellar keratoplasty techniques. For this reason, two distinct components are assembled in the donor button. The central, full-thickness part, maintains the optical advantages of conventional PKP surgery while remaining confined within a safe distance from the corneoscleral limbus; where only the peripheral wing of endothelium and stroma is near to the angle without being exposed to the limbal vascular bed (7).

The peripheral wing of deep stroma and endothelium creates an annular area of lamellar healing around the full-thickness component. In this procedure, sutures merely prevent the donor button from sliding out of position (7). They need not to be so tight; as when they seal the surgical wound the intraocular pressure tends to push the healing surfaces together (8).

However, the creation of a top-hat configuration is cumbersome. Dissecting the pocket in the recipient to accommodate the donor wing is done freehand, where lamellar stromal dissection is carried out with

crescent knife from the base of the incision about 1 mm peripherally and the corneal button excised using corneal scissors at the peripheral end of the posterior lamellar stromal dissection (8). An accurate cut on the recipient is hard to attain because the scissors used to cut the inner circle (the niche for the lamellar wing) create an irregular, imperfectly round cut. In top-hat PKPs, this irregularity may cause more intra- and postoperative leakage from the graft-host interface (9).

The resulting pocket may be too small or too large .A pocket that is too small might press against the donor's wing inducing descemet membrane (D.M.) folds, while a pocket that is too large might lead to malapposition and wound leakage. Thus, in a top-hat configuration, a good donor–recipient apposition is achieved only in the anterior half of the cornea, making the top-hat configuration more prone to wound leakage (7).

The new half-top-hat (HTH) configuration, described here, has a larger area of opposition, as the whole recipient cornea is in good apposition with the donor; while in top hat configuration, the posterior lamella composed of stroma and endothelium is removed during creation of the pocket. Thus, HTH- PKP is expected to be more watertight than a regular top-hat PKP. Moreover, since the wing does not have to fit into a misshaped pocket, have fewer descemet membrane folds and presumably induces less high-order aberration (7).

In the HTH configuration, a full thickness recipient cornea is opposing the donor's wing tendency to slip out, which might result in better tectonic support and a lesser risk for wound dehiscence. An added value of HTH-PKP is that the surgery is easier and faster to perform compared with a regular full top-hat configuration (7).

Aim of work:

The aim of this study is to determine if half-top-hat PKP is able to make wound healing faster; with subsequent early suture removal in comparison with regular PKP.

In addition, the following questions are tried to be answered:

1. Is it easy to perform?
2. Is it time consuming?
3. Does it achieve a rapid visual rehabilitation?
4. Is it a safe procedure?