Deep sclerectomy with autologous scleral implant versus deep sclerectomy with Mitomycin C in management of primary open angle glaucoma

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Abstract

Objective: To compare Deep sclerectomy with autologous scleral implant with deep sclerectomy with Mitomycin C in management of primary open angle glaucoma.

Materials and methods: 30 eyes of 21 patients with primary open angle glaucoma were divided into two groups (Group A: deep sclerectomy with autologous scleral implant, Group B: deep sclerectomy with Mitomycin C). Patients were followed up for 6 months regarding IOP, field of vision and UBM study of the intra-scleral bleb.

Results: 12 cases in each group reached the target IOP without use of treatment (complete success), 3 cases in each group reached the target IOP with use of anti-glaucoma treatment (qualified success). UBM showed intra-scleral bleb and intact trabeculo-Descemet membrane in all cases.

Conclusion: Both techniques appeared to be safe and effective in lowering IOP in primary open angle glaucoma.

Key words: Ultrasound biomicroscopy, glaucoma, Deep sclerectomy, glaucoma implants, intraocular pressure.

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List of abbreviations

Abbreviation	Stands for
JCT	Juxtacanalicular connective tissue
IOP	Intra-ocular pressure
UBM	Ultrasound biomicroscopy
SC	Schlemm's canal
DS	Deep sclerectomy
TDM	Trabeculo-Descmet membrane
HEMA	Hydroxyethyl Methacrylate
POAG	Primary open angle glaucoma
MMC	Mitomycin C
DSCI	Deep sclerectomy with collagen implant
AS-OCT	Anterior segment optical coherence tomography
DSMMC	Deep sclerectomy with Mitomycin C.
S-MMC	Mitomycin C under superficial scleral flap.
D-MMC	Mitomycin C under deep scleral flap.
Er-YAG	Erbium Yttrium Aluminum Garnet laser.
5-FU	5-FluroUracil
LGP	Laser goniopuncture

OAG	Open angle glaucoma
OVD	Ophthalmic viscosurgical device.
IOL	Intra-ocular lens
RHAI	Reticulated hyaluronic acid implant.
PMMA	Polymethyl Methacrylate
NPDS	Non-penetrating deep sclerectomy
BCVA	Best corrected visual acuity
SITA	Swedish international threshold algorithm
MD	Mean deviation
PSD	Pattern standard deviation
C/D ratio	Cup disc ratio
SD	Standard deviation
NPGS	Non-penetrating glaucoma surgery
SST	Sub-scleral trabeculectomy.
SPSS	Statistical Package for the Social Science.

Introduction

In the last few years, non-penetrating glaucoma-filtering procedures like deep sclerectomy and viscocanalostomy have become more and more popular. In these techniques, a trabeculo-descemetic membrane is left in place, in order to avoid an abrupt IOP decrease. Some studies showed fewer complications and similar success rates compared to standard trabeculectomy. ***(Mousa, 2007), (Chiselita, 2001)***

Although a controversy may arise about the value of non-penetrating surgery because of the need for laser interference postoperatively converting the procedure to a perforating surgery again, this stepped intervention is less risky than surgical opening of the anterior chamber during trabeculectomy from the start and it was supported by most of the previous studies. ***(Ambresin et al., 2002), (Vuori, 2003)***

Removal of the deep scleral flap leads to formation of an empty scleral space called "aqueous decompression space", wherein the aqueous humor will be collected before its drainage. In order to keep the aqueous decompression space open, different implant devices have been proposed such as collagen implants, reticulated hyaluronic acid implants ***(Mermoud et al., 1999)***, and the T Flux implant ***(Ravinet et al., 2004)***.

Those implants, however, are expensive and not easily available everywhere. Therefore, cheaper materials were tried to be used as an implant, like chromic suture material. ***(Wevill et al., 2005)***

Another trial was to use an autologous scleral implant as an alternative to collagen implant. Sclera was chosen because of its collagen structure and at the same time it is better than homologous sclera because of the risk of transmission of diseases. ***(Devloo et al., 2005)***

Mitomycin C (MMC) may help reach the target IOP by modulating wound healing. Its use lowers the IOP an additional 2–4 mm Hg in both deep sclerectomy with or without implant as well as in trabeculectomy ***(Kozobolis et al., 2002)*** and has been effective with various application protocols. However, the use of MMC has been associated with a higher and often delayed-onset incidence of avascular blebs and transconjunctival oozing, especially in trabeculectomy. ***(Anand et al., 2006)***

Aim of the work

This work aims at assessing the effectiveness of deep sclerectomy with autologous scleral implant versus deep sclerectomy with Mitomycin C in management of primary open angle glaucoma regarding:

- Lowering of IOP.
- Postoperative healing of the surgical area in deep sclerectomy.

Anatomy of the angle

The anterior chamber is bounded anteriorly by the inner surface of the cornea except at its far periphery where it is related to trabecular meshwork. Posteriorly it is bounded by the lens within the papillary aperture, by the anterior surface of the iris and peripherally by the anterior surface of the ciliary body. The anterior and posterior boundaries meet at the drainage angle of the chamber***. (Bron et al., 1997)***

Clinical features of the drainage angle

- **Ciliary band:** the most posterior landmark, which represent the anterior face of ciliary body.
- **Scleral spur:** Pale translucent narrow strip of sclera tissue which is located anterior to the ciliary band and marks the posterior boundary of corneoscleral meshwork.
- **Trabecular meshwork:** A broad band of tissue approximately 750 μm in width which is relatively featureless in the un-pigmented eyes and extends from the scleral spur to the Schwalbe's ring.
- **Schwalbe's ring:** the anterior limit of the drainage angle. This is a fine scalloped border at the end of Descemet membrane. ***(Bron et al., 1997)***