Bleb survival in subscleral trabeculectomy

Essay

Submitted by

Bassam Mohamed Yusri Mohamed
M.B., B.Ch.
Faculty of Medicine
Ain Shams University

For the partial fulfillment of Master Degree in ophthalmology

Supervised by

Prof. Dr. ALI HASSAN SAAD
Professor of ophthalmology
Faculty of Medicine
Ain Shams University

Dr. MOMEN MAHMOUD HAMDI
Lecturer of ophthalmology
Faculty of Medicine
Ain Shams University

Faculty of Medicine
Ain Shams University
Cairo, Egypt
2014
Introduction:

Since first described by Cairns in 1968\(^{(1)}\), trabeculectomy (SST) has been widely used and remains the gold standard in surgical treatment of glaucoma. Long-term success depends on preoperative and intraoperative conditions, but long-term success also highly depends on the persistence of filtration efficiency at the bleb site.\(^{(2,3)}\)

The decision to proceed with glaucoma surgery must include an evaluation of risk factors other than IOP alone; those were described in the major recent randomized controlled trials of glaucoma treatment such as the age of the patient, race, central corneal thickness, cup-to-disc ratio, uveitis\(^{(4)}\), neovascularization\(^{(5)}\) & cataract surgery\(^{(6)}\).

In addition, other factors were assessed and found to be noncontributory, others were found to be protective. All of these factors should be considered prior to proceeding to surgery.\(^{(7)}\)

Once the decision to proceed with glaucoma surgery has been made, several factors should be considered during surgical planning such as patient age, external disease, general health status & ocular surface disease. Careful pre-operative evaluation must be performed to determine the optimal site and type of glaucoma surgery, including the use of antifibroblastic agents.\(^{(7)}\)
The use of anti-fibrotic agents in filtering procedures is associated with a higher success but also with a higher complication rate (hypotony due to over-filtration, bleb leak, and ocular infection). For this reason an individualized consideration of the risk/benefit ratio is recommended \(^{(8)}\).

Mitomycin C (0.1–0.5 mg/ml solution) is more potent than 5FU & so has been widely used intraoperatively more than 5FU \(^{(9)}\).

Trabeculectomy with collagen matrix implant (ologen\(^{TM}\) implant has proven nearly the same safety & efficacy of trabeculectomy with Mitomycin C \(^{(10)}\).

The anti-inflammatory effects of hyaluronic acid and its space-occupying properties may be useful in filtering glaucoma surgery, so injections of HealaFlow® below the scleral flap and the conjunctiva at the end of the surgery showed promising IOP-lowering effects in trabeculectomy \(^{(11)}\).

Bevacizumab may also be promising in lowering IOP when used intra operative specially in neovascular glaucoma management \(^{(12)}\).

An adjustable suture system can be added to allow a gradual titration of the intraocular pressure—more gradual than that seen with suture removal or massage \(^{(13)}\).

Glaucoma suture lysis is widely used
postoperatively to achieve target pressures. \(^{(14)}\)

Bleb needling should be considered when a bleb fails post surgery. It has multiple advantages over re-
operations. \(^{(15)}\)

Postoperative observation and care of the developing filtering bleb in clinical practice is an important tool in reaching the target pressure after filtration surgery in a higher percentage of the patients \(^{(2)}\). The success of filtration surgery depends greatly on the early recognition and appropriate management of postoperative complications. Although the list of potential complications following filtration surgery is extensive, in most scenarios a short differential can be obtained by knowing only three key elements; anterior chamber depth, intraocular pressure, and bleb status. \(^{(6)}\)

Digital ocular compression and focal compression can be used to improve the function of a temporarily non- or poorly functioning filtering bleb with the use of frequent steroids. Digital ocular compression (DOC) can be applied to the inferior sclera or cornea through the inferior eyelid, or to the sclera posterior to the scleral flap through the superior eyelid \(^{(16)}\).
Aim of this Study:

The aim of this essay is to discuss preoperative, intraoperative & postoperative measures to ensure bleb survival in trabeculectomy. And the causes, prevention & management of bleb failure.
References:


2. Klink T, Guthoff R, Grehn F, Schlunck G.


15. Allen LE, Manuchehri K, Corridan PG. The treatment of encapsulated trabeculectomy blebs in an out-patient setting using a needling technique

List of abbreviations

5FU : 5-Fluorouracil
AGIS : Advanced Glaucoma Intervention Study
ALT : argon laser trabeculoplasty
FFSS : The fluorouracil filtering surgery study
GAG : glycosaminoglycan
IBAGS : Indiana Bleb Appearance Grading Scale
IOP : intra ocular pressure
MMC : Mitomycin-c
MBGS : Moorfileds Bleb Grading System
OLO : Ologen
PACG : primary angle-closure glaucoma
POAG : primary open angle glaucoma
SST : subscleral trabeculectomy
VEGF : vascular endothelial growth factor
# list of contents

<table>
<thead>
<tr>
<th>Subject</th>
<th>page no</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acknowledgement</td>
<td>i</td>
</tr>
<tr>
<td>Aim of this Study</td>
<td>ii</td>
</tr>
<tr>
<td>List of abbreviations</td>
<td>iii</td>
</tr>
<tr>
<td>List of figures</td>
<td>1</td>
</tr>
<tr>
<td>Introduction</td>
<td>1</td>
</tr>
<tr>
<td>Chapter (1) : Patient selection and preoperative assessment</td>
<td>4</td>
</tr>
<tr>
<td>Chapter (2) : Intraoperative measures to increase bleb survival</td>
<td>17</td>
</tr>
<tr>
<td>Chapter (3): Postoperative care and prevention of failure of the filtering bleb</td>
<td>48</td>
</tr>
<tr>
<td>Summery</td>
<td>73</td>
</tr>
<tr>
<td>References</td>
<td>75</td>
</tr>
<tr>
<td>Arabic summary</td>
<td></td>
</tr>
</tbody>
</table>
## List of figures

<table>
<thead>
<tr>
<th>FIGURE</th>
<th>SUBJECT</th>
<th>PAGE NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Three sequential Humphrey visual fields performed over a 2-year period Showing progression of a paracentral visual field defect</td>
<td>8</td>
</tr>
<tr>
<td>2</td>
<td>A fornix-based flap affords excellent visualization of the limbus, especially in eyes with prior scarring. The scleral flap is half the thickness of the sclera</td>
<td>18</td>
</tr>
<tr>
<td>3</td>
<td>Changes in technique leading to improvements in outcome following the use of antimetabolites</td>
<td>28</td>
</tr>
<tr>
<td>4</td>
<td>Showing diffuse bleb in patients right eye using large area of treatment vs a smaller area of treatment with mitomycin-c. Dramatic difference in bleb appearance</td>
<td>29</td>
</tr>
<tr>
<td>5</td>
<td>Biodegradable collagen matrix implant positioned directly above the scleral flap</td>
<td>40</td>
</tr>
<tr>
<td>6</td>
<td>Trabeculectomy with expanded polytetrafluoroethylene (ePTFE) membrane implant</td>
<td>47</td>
</tr>
<tr>
<td>7</td>
<td>Digital pressure applied 180° away from the bleb.</td>
<td>52</td>
</tr>
<tr>
<td>8</td>
<td>Digital pressure applied to the edge of bleb</td>
<td>52</td>
</tr>
<tr>
<td>9</td>
<td>Visualization of scleral suture through Hoskins lens.</td>
<td>57</td>
</tr>
<tr>
<td>10</td>
<td>Needle is advanced carefully under the flap and the flap elevated.</td>
<td>61</td>
</tr>
<tr>
<td>11</td>
<td>Injection of 5FU being given through a viscoelastic wall.</td>
<td>67</td>
</tr>
<tr>
<td>12</td>
<td>(a) overview, (b) slitlamp photograph: Filtering bleb with WBCS = 11 points (Vascularisation = 2, Corkscrew vessels = 3, Encapsulation = 3, Microcysts = 3).</td>
<td>71</td>
</tr>
<tr>
<td>13</td>
<td>(a) overview, (b) slitlamp photograph: Filtering bleb with WBCS = 6 points (Vascularisation = 2, Corkscrew vessels = 3, Encapsulation = 1, Microcysts = 0).</td>
<td>72</td>
</tr>
</tbody>
</table>
Aim of this Study

The aim of this essay is to discuss preoperative, intraoperative & postoperative measures to ensure bleb survival in trabeculectomy. And the causes, prevention & management of bleb failure.
First of all, I thank ALLAH,

Then, I would like to express my great thankfulness and appreciation to Prof. Dr. ALI HASSAN SAAD Professor of ophthalmology, Faculty of Medicine, Ain-Shams University, for his help, encouragement, patience and support throughout this work.

I also would like to show my gratitude and thankfulness to Dr. MOMEN MAHMOUD HAMDI, Lecturer of ophthalmology Faculty of Medicine, Ain-Shams University, for his effective scientific supervision and precious assistance.

Last but not least, I thank all my family for their patience, support and understanding.
Bleb survival in subscleral trabeculectomy

Introduction

Since first described by Cairns in 1968 subscleral trabeculectomy (SST) has been widely used and remains the gold standard in surgical treatment of glaucoma.\(^1\)

The chief aim of this operation is to allow aqueous to bypass the trabecular meshwork into the subconjunctival space, but at the same time, ensuring an optimum intraocular pressure (IOP) (i.e., not too high or too low) as well as maintaining the anatomy of the globe (i.e., preventing shallowing of the anterior chamber).\(^2\)

In this operation an initial pocket is created under the conjunctiva and Tenon's capsule and the wound bed is treated for several minutes with mitomycin C (MMC) or 5-fluorouracil (5-FU) soaked sponges. These chemotherapeutics help to prevent failure of the filtering bleb from scarring by inhibiting fibroblast proliferation. Alternatively, non-chemotherapeutic adjuvants can be implemented to prevent super scarring by wound modulation, such as collagen matrix implant. A partial thickness flap with its base at the corneoscleral junction is then made in the sclera and a window