

Comparative Study of Viscotrabeculotomy Compared to Conventional Trabeculotomy in the Surgical Management of Congenital Glaucoma

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Abstract

Purpose: To assess the efficacy of viscotrabeculotomy in the surgical management of congenital glaucoma as compared to conventional trabeculotomy.

Methods: In a prospective study patients with congenital glaucoma matching the inclusion criteria underwent viscotrabeculotomy (VT) group, 21 eyes, and trabeculotomy (T) group, 20 eyes. Patients were followed up for minimum of 6 months. A probability value (p value) less than 0.05 was considered significant.

Results: The mean preoperative IOP was 23.5 and 24.3 mmHg in the VT and T groups respectively. Postoperatively, IOP dropped at six months to 14.7 and 17 mmHg in the VT and T groups respectively. That was significant in either group when compared to preoperative IOP ($p=0.01$ & $p=0.001$ in the VT & T groups respectively), but was not significant between both groups at the same point of comparison ($p=0.853$). At 6 months postoperatively, complete success was achieved in 61.9% in the VT group compared to 60.0% in the T group. This slight preference for VT (Odds ratio 1.08) was statistically not significant in comparison to that achieved in the T group ($p=0.448$). The incidence of operative hyphema was 38.1% in the VT group compared to 20% in the T group. Although the relative risk for hyphema in the VT/T was 1.9 (confidence interval 0.6785 to 5.3475), that was statistically insignificant ($p=0.22$).

Conclusions: Both techniques were equally effective in the reduction of IOP in the management of congenital glaucoma. Viscotrabeculotomy does not appear to improve the surgical outcome in congenital glaucoma.

Key words:

Glaucoma – Congenital Glaucoma –

Trabeculotomy – Viscotrabeculotomy

List of Contents

Contents	Page
List of Contents	I
Acknowledgments	II
Abstract	III
List of Figures	IV
List of Tables & Appendices	V
List of Abbreviations	VI
Introduction	1
Aim of work	2
Review of Literature	3
<i>Chapter One: Developmental anatomy & anatomy of the anterior chamber angle</i>	3
<i>Chapter Two: Physiology of aqueous production and outflow</i>	12
<i>Chapter Three: Pathophysiology & Genetics of primary congenital glaucoma</i>	14
<i>Chapter Four: Clinical picture of primary congenital glaucoma</i>	17
<i>Chapter Five: Treatment of primary congenital glaucoma</i>	24
<i>Chapter Six: Prognosis of primary congenital glaucoma</i>	37
Materials & Methods	40
Results	48
Discussion	59
References	70
Appendices	82
English Summary	88
Arabic Summary	90

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List of Figures

Figure	Description	Page
1	Ingrowth of neural crest cells	3
2	Progressive deepening of anterior chamber angle	4
3	Scheme for angle structure	7
4	Three layers of trabecular meshwork	9
5	Canal of schlemm	10
6	Schematic view of outflow system	11
7	Routes of aqueous outflow	13
8	Corneal measurements with calipers	20
9	Gonioscopic view of two eyes with congenital glaucoma	22
10	Swan –jacob goniolens	27
11	Goniotomy	27
12	Trabeculotomy steps	30
13	Haab’s Striae	41
14	Healon GV	41
15	30 Gauge metal cannula	42
16	Viscotrabeculotomy surgical steps	44
17	Mean IOP (mmHg) in VT (Viscotrabeculotomy) & T (Trabeculotomy) groups	54
18	Mean Cup/disc ratio in VT (Viscotrabeculotomy) & T (Trabeculotomy) groups	54
19	Kaplan-Meier Survival indices for Total success during the postoperative follow up of six months in T &VT groups	57

List of Tables & Appendices

Table	Description	Page
1	Microscopic and ultrastructural observation in PCG	15
2	Statistical analysis of preoperative data in the VT & T groups	49
3	Operative and postoperative complication rates in both groups	50
4	Mean IOPs, antiglaucoma medications, HCD, C/D ratio and success rates before and after glaucoma surgery	51
5	Corneal condition during the follow up in either group	52
6	Statistical analysis of follow-up data in both groups	52-3
7	Comparison of preoperative versus postoperative intraocular pressure, C/D ratio and HCD, between either group using the Paired T-Test	56
Appendix	Description	
A	Individual pre-operative raw data in the viscotrabeculotomy group	82
B	Individual pre-operative raw data in the trabeculotomy group	83
C	Individual follow up raw data in the viscotrabeculotomy group	84-5
D	Individual follow up raw data in the trabeculotomy group	86-7

List of Abbreviations

AM	Antiglaucoma medications
C/D	Cup/Disc ratio
CCT	Central corneal thickness
CL⁻	Chloride
Cum	Cumulative
HCD	Horizontal corneal diameter
IOP	Intraocular pressure
LED	Laser emitting diode
LT	Left
M	Month
N	Number
Na, k pase	Sodium potassium Atpase
PCG	primary congenital glaucoma
Postop.	Postoperative
Preop.	preoperative
RT	Right
SSC	Sclera spur cells
Std. deviation	Standard deviation
T	Trabeculotomy
VT	Viscotrabeculotomy
W	Week

Introduction

Introduction

Primary congenital glaucoma (PCG) affects 1:10,000 births, and is more severe in the Middle East than in Western countries. The earlier in life the disease occurs the worse the prognosis (**Dureau et al., 1998**). While medical treatment of PCG is useful as a temporary measure or as adjunctive therapy, surgery is always necessary (**Turach et al., 1995**). Options include goniotomy, trabeculotomy, trabeculectomy, or combined trabeculotomy-trabeculectomy. The effectiveness of goniotomy or trabeculotomy in PCG is very high in Western countries with reported success rates of 81–90% (**Anderson, 1983; McPherson & Berry, 1983**). This is in contrast with the low success rate in the Middle East, 20-44% (**Debnath et al., 1989**). It has been shown that the majority of failed surgeries occur within the first year (**Mandal et al., 1997**).

As viscoelastic materials separate or stabilize tissues, stop bleeding and protect the tissues against undesired damage, the use of viscoelastics during trabeculotomy was considered to increase the success rate by prevention of postoperative hemorrhage and fibroblastic proliferation, and adhesion of the incision lips (**Tamcelik et al., 2010**).

Tamcelik and his colleagues have shown in two different reports that viscotrabeculotomy and combined viscotrabeculotomy-trabeculectomy obtained higher success rates when compared to conventional trabeculotomy and combined trabeculotomy-trabeculectomy respectively (**Tamcelik & Ozkiris, 2008**).

Aim of Work

Aim of Work

The aim of this work is to assess the efficacy of viscotrabeculotomy in the surgical management of congenital glaucoma as compared to conventional trabeculotomy.

Review of Literature

Chapter One: Developmental anatomy and anatomy of the anterior chamber angle

I – Developmental Anatomy

The aqueous outflow structures in the anterior chamber angle appear to arise from mesenchymal cells of neural crest cell origin. At the 22 to 24 mm stage (7th to 8th week), the anterior chamber angle is undifferentiated and is occupied by loosely arranged mesenchymal cells, and the anterior chamber itself is a slit-like opening (**Figure 1**).

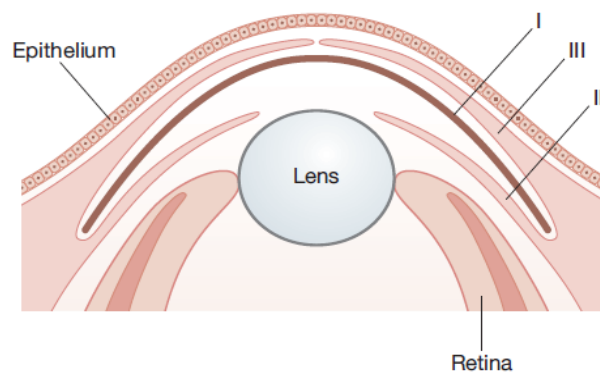


Figure (1) Ingrowth of neural crest cells. Three successive waves of ingrowth of neural crest cells are associated with differentiation of the anterior chamber. The first wave (I) forms the corneal endothelium. The second wave (II) forms the iris and the pupillary membrane. The third wave (III) develops into keratocytes, which forms the corneal stroma (quoted from Mandal & Netlan 2006).

Anderson (1981) found that the anterior surface of the iris at 5 months gestation inserts at the edge of the corneal endothelium, covering the cells that are destined to become the trabecular meshwork. This appears to be what **Worst (1966)** called the foetal pectinate ligament, separating the corneoscleral meshwork primordium from the anterior chamber angle (**Figure 2**).

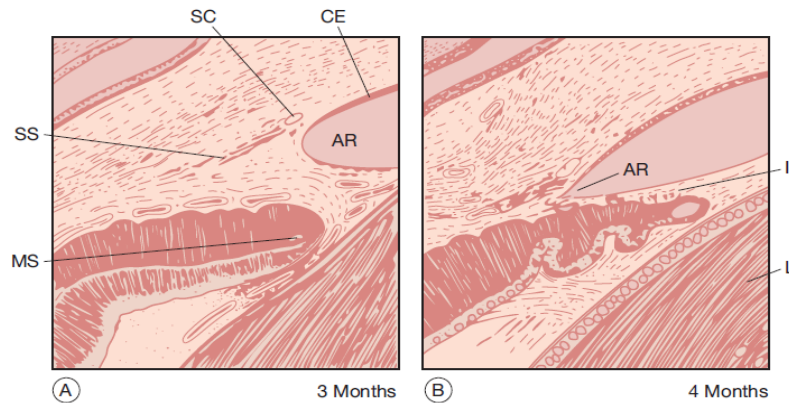


Figure (2) A. Progressive deepening of the anterior chamber angle. **A.** At 3 months, the angle recess (AR) is anterior to a rudimentary Schlemm's canal (SC), and scleral spur (SS) has formed. The corneal endothelium (CE) extends into the angle recess. The pigment epithelium and the marginal sinus (MS) of the ectodermal optic cup are posterior to the angle recess. **B.** At 4 months, the angle recess has deepened and the marginal sinus has moved anteriorly. The angle recess has extended slightly further from the corneal endothelium. Condensed tissue just posterior to Schlemm's canal is developing scleral spur. The dilator muscle of the iris (I) has reached its root and the lens (L) has continued to develop (quoted from Mandal & Netland 2006).

At birth, the insertion of the iris and ciliary body is near the level of the scleral spur, and usually posterior to it. On gonioscopy of a normal newborn eye, the insertion of the iris into the angle wall will be seen posterior to the scleral spur in most cases, with the anterior extension of the ciliary body seen as a band anterior to the iris insertion. The iris insertion into the angle wall is rather flat, as the angle recess has not yet formed. Continued posterior sliding of the uveal tissue occurs during the first 6 to 12 months of life, which is apparent gonioscopically as formation of the angle recess (*Mandal & Netland, 2006*).

Theories of abnormal development in primary congenital glaucoma:

The intraocular pressure (IOP) elevation in primary congenital glaucoma is due to an abnormal development of the anterior chamber angle that leads to reduced facility of aqueous outflow. Theories of mechanism parallel the basic concepts regarding the normal development of the anterior chamber angle, most of which are no longer accepted as being entirely correct (*Mandal & Netland, 2006*).