Journal Bangladesh Glaucoma Society

July 2021 Volume 09 Number 02

J B G S

Contents

Journal
Bangladesh Glaucoma Society

Volume - 09 Number - 02 July 2021

Journal
Bangladesh Glaucoma Society (JBGS)

Volume - 09, Number-02, July 2021

Published by :
Dr. Bipul Kumer De Sarker
Publication & Publicity Secretary
On behalf of the
Bangladesh Glaucoma Society
House # 12A, Road # 05, Dhanmondi, Dhaka
email : bangladeshglaucomasociety@gmail.com
website : www.bgsbd.net

Printed at :
New Ekata Computer & Printers
435/A-2, Baro Moghbazar, Dhaka-1217
Tel : 01715444644

Courtesy : ARISTOVISION

Bangladesh Glaucoma Society

Editorial Board

Address of Correspondence
Executive Editor, JBGS
Harun Eye Foundation Hospital
House # 12A, Road # 05, Dhanmondi, Dhaka
email : bangladeshglaucomasociety@gmail.com
website : www.bgsbd.net

Journal of Bangladesh Glaucoma Society (JBGS) Editorial Policy

The Journal of Bangladesh Glaucoma Society (JBGS) is the official journal of Bangladesh Glaucoma Society (BGS). JBGS is published regularly and half yearly.

The JBGS editorial board maintains the following policy:

- It is a national level, peer reviewed, open access journal.
- JBGS is committed to transparency.
- JBGS provides a stimulating forum for discussion of clinical, scientific and socioeconomic issues of greatest concern to clinicians who care for glaucoma patients.
- Each of the issue tries to present original articles on new approaches to diagnosis, innovations in pharmacological therapy, surgical technique, and basic scientific advances in the field of glaucoma that impact on clinical practice.
- JBGS adheres to the highest standards concerning its editorial policies on publication ethics, scientific misconduct, consent and peer review criteria.
- The journal always strictly follows guidance produced by bodies that include the Committee on Publication Ethics (COPE), the World Association of Medical Editors (WAME) and the International Committee of Medical Journal Editors (ICMJE).
- JBGS takes all possible misconduct seriously. If an Editor, author or reader has concerns that a submitted article describes something that might be considered to constitute misconduct in research, publication or professional behaviour they should forward their concerns to the journal so that JBGS editorial body can address the allegations properly.
- As an open access journal, JBGS adheres to the Budapest Open Access Initiative definition of open access. Articles are published to facilitate reuse of the content and authors retain the copyright.
- Although it is an open access journal, no payment information is requested for any article which is accepted, so that the ability to pay cannot affect editorial decisions.
- Articles submitted to JBGS are subject to peer review. The journal operates single blind peer review whereby the names of the reviewers are hidden from the author; which is the traditional and most common method of reviewing.
- JBGS believes that to make the best decision on how to deal with a manuscript the journal editor should know about any competing interests that authors may have. There is nothing inherently unethical about a competing interest but it should be acknowledged and openly stated.

Bangladesh Glaucoma Society

JBGS Review Board

Bangladesh Glaucoma Society

Executive Committee 2020-2021

Past President & Advisors
Prof. Sk. M.A. Mannaf
Prof. Syed Maruf Ali
Prof. M. Nazrul Islam
Prof. Md. Arif Mian
Dr. Muhammad Ziaul Karim

President
Prof. Dr. Md. Mizanur Rahman

President Elect
Prof. Dr. Hassan Shahid

Secretary General
Dr. Salma Parvin

Treasurer
Prof. Dr. Iftekhar Md. Munir

Joint Secretary
Dr. Siddiqur Rahman

Organizing Secretary
Dr. Ashraful Huq Ridoy

Scientific Secretary
Dr. Ruhi Mannan

Office Secretary
Dr. Shahnaz Begum

Publication & Publicity Secretary
Dr. Bipul Kumer De Sarker

Entertainment Secretary
Dr. Harun-Ur Rashid

Executive Members
Dr. Md. Quamrul Islam Khan
Prof. Sheikh M Hossain
Dr. Md. Musharaf Hossain
Dr. Md. Safiul Islam Prodhan
Prof. M. A. Bashar Sheikh
Prof. Dr. Kh. Ziaul Islam Md. Ali
Prof. Dr. Zakia Sultana Shahid
Prof. Dr. M. Hafizur Rahman
Dr. M.A. Karim
Dr. Mohammad Zafrul Hassan
Dr. Ishtiaque Anwar

Instruction for authors

Original papers written in English will be considered for publication provided these have not been published previously and are not under consideration for publication elsewhere.

Conditions for manuscript submission

- All manuscripts will be subjected to peer and editorial review
- Accepted manuscripts become the property of the Bangladesh Glaucoma Society Journal.
- The author should obtain written permission from appropriate authority if the manuscript contains any table; data or illustration from previously published in other journals. The letter of permission should be submitted with manuscript.
- If the photographs are not disguised, permission from the patient or parents/guardians to print should accompany the manuscript. Otherwise identity will be blackened out.
- Rejected manuscripts/electronic copies / illustrations / photographs will not be returned to the authors.
- Editors are not responsible for courier/postal failure.

Manuscript preparation

The format of the Bangladesh Glaucoma Society journal complies with "Uniform Requirements for Manuscripts Submitted to Biomedical Journals" published by the International Committee of Medical Journals Editors in Vancouver British Columbia in 1979, (the widely accepted "**Vancouver style")** published in the Annals of Internal Medicine 1982; 96:766-71. All scientific units should be expressed in System International (SI) units. Authors are referred to Annals of International Medicine 1987; 106:114-29 for guidance in the use of SI units. All drugs should be mentioned in their generic form.

- Should be typed in English and on one side of A4 (290x210cm) size white paper, using Times New Roman font, size 12, with single space
- There should be one original and two paper copies and one IBM compatible electronic copy.
- There should be a margin of 2.5 cm at top and bottom, and 1.2 cm left and right.
- Pages should be numbered in English numerical at the upper right hand, consecutively, beginning with the title page.
- Manuscripts should be submitted in the following order:

Title

should not exceed 100 characters.

Abstract

With a specific format with six sections: Background, Objective, Methodology, results, Conclusion and Acknowledgements, Keywords, address of correspondence (about 350 words maximum). All these section will be Times New Roman font sixe 12 and italic but not bold. No reference are allowed in the abstract.

Text

(Introduction, Materials & Methods, results, Discussion, conclusion).

Acknowledgements

References

Photographs

- In CD/Pen drive
- With appropriate labeling (number in English numerical, title of photographs and title of manuscripts.)

Illustrations

- All illustrations should be cited in the text
- Illustration should be numbered in English numerical and labeled properly, placed appropriately in relation to text of manuscript.

Tables

- Should be appropriately titled.
- Numbered with Roman numerical in order of text.
- Abbreviation if used, should be explained in foot-notes.
- Same table should not be repeated as chart.

Placement

- All photographs, illustrations and tables should be placed in the text in their appropriate places where their description are given.

Instruction for authors

References

- References from journal should be indicated by superscript numbers consecutively in the text (e.g."…….has been reported[1]; or as shown by Rahman[2]) in the order in which they are first mentioned and should be listed in numerical order at the end of the article.
- References cited only in tables or legends or illustrations should be numbered in accordance with a sequence established by the first mention in the text.
- Titles of journals should be abbreviated according to Index Medicus or given in full.
- References must include: (i) all authors, surnames and initials if there are more than 6 authors, the first six authors followed by et al; (ii) the full title of the paper; (iii) the abbreviated or full title of the journal in italic; (iv) the year of publication; (v) the volume no will be bold; (vi) the first and last page numbers followed by full stop.
- References from books must include: (i) authors name (ii) title of article (iii) editors name/s (iv) name of the chapter (V)place of publication (vi) name of publisher (vii)year of publication and page numbers.
- Documents in electronic format must include: (i) title (ii) authors name (iii) year of publication (iv) website address date of access.

Manuscripts Submission

The manuscripts should be submitted to the editor in chief with a covering letter, mentioning that the work has not been published or submitted for publication anywhere else.

Reprints for the authors

2 copies of original journal and five copies of each article will be provided to the corresponding author free of cost.

Copy right

Common mistakes in drug prescription

M H S Suhrawardy[1]

The article is intended to acknowledge my colleagues to be cautious when they are writing medicines for the patients. As the drugs may cause harm or be of no use for the patients. It is not claimed that this article is exhaustive. Never the less, the mistakes tackled are real and are to be corrected.

All the error dealt with are singled out, for they have to be recognized before they can be corrected; then correct forms are substituted for incorrect ones; finally simple explanations are given wherever necessary to justify particular usages.

Antibiotics

1. Fluoroquinolones (Ciprofloxacin, Moxifloxacin, etc.) eye drop : Don't use in corneal abrasion (epithelial loss without infection). Because it prevents epithelial cell division, interfering with the enzyme DNA gyrase, thus healing. Use Chloramphenicol drop (don't prevent healing): 3 times a day.
2. Don't use bactericidal and bacteriostatic eye drops at a time. Because; the bactericidal eye drop (Moxifloxacin) kills bacteria at the Log phase (new bacteria) of its growth, while bacteriostatic (Chloramphenicol) prevents bacteria to divide to go to its Log phase.
3. Don't use kanamycin in "Mixed" infection. Because, it works absolutely in gram –ve infection, while vancomycin works absolutely in gram +ve infections.

Antiviral

Don't use : Acyclovir in RNA (Measles, Rubella, Polio etc.) infections; use it in DNA viral (Herpes, Adino, Parvo etc.) infection. Because the drug is activated by Thymidine Kinase and inhibits the viral DNA synthesis but RNA virus does not consist thymidine (but uracil).

Don't Prescribe : Tab. GABA (anticonvulsant drug) alone in post Herpetic Neuralgia. Prescribe antidepressant (Tryptin) along with it to avoid Psychiatric disorder of the patient.

Autonomic Drug

Morphine : Don't inject in patient meeting RTA for the constriction of pupil (local drop does not work), as it may depress the cortical centre and kill the patient.

Atropine 1% eye drop : Don't prescribe for children, as it will go through nasolacrimal duct to nose and absorb, causing atropine toxicity. Prescribe ointment.

Ocular Hypotensive

Carbonic anhydrase inhibitor : Don't prescribe in kidney diseased patient indiscriminately, as it causes metabolic acidosis.

Beta-blocker: Don't prescribe it indiscriminately in Bronchial asthma, Heart block, COPD.

Author Information:

[1] Prof. Md. Hassan Shahid Suhrawardy
Head of the department of Ophthalmology (ex)
Bangladesh Medical College, Dhaka

Original Article

Efficacy and Safety of A Low Cost Glaucoma Drainage Device Implantation in Refractory Glaucoma - A Prospective Longitudinal Study

H Sultana[1], B K D Sarker[2], S J Kabir[3], T R Chhara[4], A Rahman[5], S Manjur[6], I Ikbal[7], S Majumder[8] , A F Jahan[9]

Abstract

Purpose : To determine the efficacy and safety of a low cost glaucoma drainage device implantation in refractory glaucoma.

Materials and Methods : In this prospective, longitudinal study 30 Patients of refractory glaucoma where we implanted low cost glaucoma drainage device- Aurolab Aqueous Drainage Implant (AADI) were studied between November 2021 to April 2022. All surgeries were performed by a single surgeon using the same technique each time. The patients were followed up for 3 months postoperatively. Outcome measures were postoperative intraocular pressure(IOP), Best corrected visual acuity (BCVA), number of anti-glaucoma medications and complication after surgery. Complete success was defined as an IOP 5 and 21 mm Hg, with no additional glaucoma medications.

Results : The majority of the patients were male (56.7%), where female were 43.3%. The mean age was 24.97 (±16.5). There was significant decrease in mean preoperative IOP from 31.67 (±9.8) mmHg to 12.7 (±4.0) mmHg at 3 months follow up with mean percentage of reduction of 59.9% (P value <0.001). Mean number of preoperative topical antiglaucoma medications (AGM) decreased from 3.17 (±0.59) to 0.17 (±0.53) at 3 months follow up. Visual acuity remains stable in 10 (33.3%) eyes, improved in 9 (30%) eyes and deteriorated in 11 (36.7%) eyes. Complications occurred in 4 patients (13.3 %), where hyphaema in 1 (3.3%) patient, choroidal detachment (CD) in 1 (3.3 %) patient and choroidal detachment with retinal detachment in 2(6.6%) patients. The overall success rate was (96.6%).

Conclusions : Non valved low cost glaucoma drainage device (AADI) is effective and safe for patients with refractory glaucoma with good intraocular pressure control. Still further follow-up is recommended to see sustainability over time.

Keywords : Non valved Glaucoma Drainage Device, GDD, refractory glaucoma, Aurolab Aqueous Drainage implant, AADI.

Authors Information :
[1]Habiba Sultana, Long term fellow, Glaucoma, Ispahani Islamia Eye Institute & Hospital, Bangladesh
[2]Bipul Kumer De Sarker, Consultant Glaucoma, Ispahani Islamia Eye Institute & Hospital, Bangladesh
[3]Syed Jahangir kabir
[4]Tania Rahman Chhara
[5]Anisur Rahman
[6]Salma Manjur
[7]Iftekhar Ikbal
[8]Samia Majumder
[9]Akhter Ferdoshe Jahan
[1, 8, 9] Long term fellow, Glaucoma, Ispahani Islamia Eye Institute & Hospital, Bangladesh.
[2, 3, 4, 5, 6, 7]Consultant Glaucoma, Ispahani Islamia Eye Institute & Hospital, Bangladesh

Introduction

Refractory glaucomas are challenging to treat as medical therapy is usually ineffective; additionally, these either do not respond well to conventional filtering surgery or have high failure rates[1]

Aqueous drainage implants have become the mainstay in the management of eyes with refractory glaucoma, which typically involve eyes with prior failed trabeculectomy or secondary glaucomas that are known to be high risk for failure of trabeculectomy,[2]such as neovascular or uveitic glaucoma. Greater severity of glaucoma usually leads to more medications and escalating costs of treatment[3].

Typically, GDDs create alternate pathways by channeling aqueous from the anterior chamber to an equatorial plate through a long tube and promote bleb formation posteriorly.[4]

The most commonly used drainage devices are the Baerveldt glaucoma implant which is without a valve mechanism and the Ahmed glaucoma implant, which has an intrinsic valve mechanism to prevent overfiltration and thus prevent hypotony[5]. Two randomized control trials evaluated the safety and efficacy of the

Baerveldt versus Ahmed valve for treating eyes with refractory glaucoma and found the Baerveldt to have lower failure rates at 5 years, but it carried a slightly higher risk of hypotony[5-7]. Despite the proven efficacy of these devices in managing complicated eyes with intractable glaucoma the cost burden prohibits their widespread application, especially in the developing world where patients socio-economic status is an important determinant for choosing treatment options.

Most devices are imported from the West, expensive, and unaffordable to a large majority of patients with refractory glaucoma. Thus, there is a need for newer and more affordable drainage implants to address the situation and meet the increasing demand of drainage implants.

The Aurolab Aqueous Drainage Implant (AADI; Aurolab, Madurai, India) is a new, low-cost drainage implant based on similar principles as the Baerveldt implant, is without a valve, and has been shown to be effective in lowering IOP in some recent studies [8-11].

Professor George Baerveldt authorised the use of his very successful design, and the device was manufactured in collaboration with the Bascom Palmer Eye Institute, Miami, Florida. The AADI was made commercially available in India in June 2013. [12]

The 32-mm long end plate extends beyond 2 clock hours of circumference on the equatorial sclera. Though the implant is available for use in India, there are only a couple of published data about the safety or efficacy of this implant; [13,14]

There is evidence that non-valved implants fare better, with lower target IOP achievable with lesser number of anti-glaucoma medications and a lower failure rate. [15]

Methods

This prospective longitudinal study included 30 patients of refractory glaucoma who underwent AADI surgery from November 2021 to April 2022 with 3 months postoperative follow up. Informed consent was obtained from all eligible participants before undertaking surgery. The institutional review board of Ispahani Islamia Eye Institute and Hospital provided ethical approval for this study. Inclusion criteria was eyes with uncontrolled IOP refractory to medical treatment and conventional filtering surgery and eyes considered at high risk of failure following conventional filtering surgery .Exclusion criteria was eyes where Goldmann applanation tonometry is hazardous like keratoprosthesis, uncontrolled systemic disease, active ocular disease and poor compliance or unable to give follow up. Patient demographics such as age, gender, residence, were noted followed by comprehensive ophthalmological examination including recording of baseline best corrected visual acuity(BCVA), IOP, preoperative glaucoma parameters, etiology of glaucoma, previous history of failed filtering surgery and visual field assessment, number of antiglaucoma medications (AGM) and complication after surgery. Main outcome variable was postoperative intraocular pressure. The secondary outcome measures were number of AGMs, BCVA, and complications. Complete success was defined as IOP 5 and 21 mm Hg without use of AGM. Qualified success was defined as fulfilling the above IOP criteria with the use of AGM. Total success included complete and qualified success. Failure was defined as the inability to fulfill IOP criteria, loss of perception of light, explanation of device, or any additional glaucoma surgery (second glaucoma drainage device, trans scleral diode laser, endoscopic diode laser) to reduce IOP.

Surgical procedure

All surgeries were performed by a single surgeon. The quadrant of choice for the implant was the superotemporal quadrant, followed by the inferior temporal, inferior nasal quadrants or superonasal quadrant, depending on the condition of the conjunctiva in that region. A 3-hour to 5-hour conjunctival peritomy was performed. Blunt dissection was used to lyse adhesions of conjunctiva and Tenon's capsule

from the sclera in the selected quadrant. The superior and lateral recti muscles (for superotemporal implantation) or inferior and medial recti muscles (for inferonasal implantation) were sequentially isolated, and 1 wing of the AADI was placed beneath adjacent muscle bellies. Patency of tube is checked and tube is ligated with 6-0 vicryl . The explant was then secured to the sclera 9 to 10 mm posterior to the limbus using 2 interrupted sutures of 9-0 nylon (Aurolab) through the fixation holes. The suture knots were rotated into the fixation holes to prevent erosion through the conjunctiva. A non compressing 9-0 nylon suture in the form of a box mattress was used to stabilize the tube to the sclera. The suture knots are rotated into the fixation eyelets to prevent erosion through the conjunctiva. The tube length is shortened to approximately 13 mm (measuring 3 mm when placed across the limbus), with a beveled tip opening toward the cornea. A 23-gauge needle is used to create a track 1.5-2 mm behind the limbus through which the tube is inserted either into the anterior chamber just anterior and parallel to the iris for anterior chamber placement or behind the iris for a sulcus placement. It is covered with a partial thickness scleral patch graft. Conjunctiva and Tenon's capsule were reapproximated to the limbus and closed with 8-0 vicryl. At the conclusion of the procedure, a subconjunctival injection of steroid (Dexamethasone 2mg) was given.

Postoperative antibiotics was prescribed six times daily for 4 week, and topical corticosteroids was prescribed six to eight times daily for 6–8 weeks and tapered. Topical cycloplegic eye drops were used as per requirement for 1-2 weeks. Antiglaucoma medications were continued as required for the postoperative IOP status. Follow-up visits scheduled at 1 day, 7 days, 1 month, 3 months postoperatively. Data was collected for the different outcome measures listed above which was analyzed using SPSS version 22 to generate summary statistics (mean, median, range); percentages and proportions for the outcome measures listed above.

Results

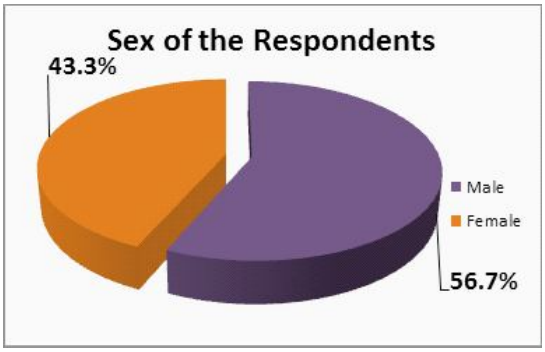
A total of 30 patients of refractory glaucoma were included in the study. The demographic and clinical data are summarized in tables below. The mean age was 24.97(±16.5) years, with male were 13(43.3%) and female were 17(56.7%).

Table 1: Distribution of Age group of the respondents

Age group of the Respondents	Frequency (n)	Percent (%)	Statistics
1 -16 Years	11	36.7	Mean= 24.97 (±16.5), Minimum= 5, Maximum= 63, Range= 58
17 - 40 Years	14	46.7	
41 - 60 Years	4	13.3	
Above 60 Years	1	3.3	
Total	**30**	**100.0**	

Table 2: Distribution of Sex of the respondents

Sex	Frequency (n)	Percent (%)
Female	13	43.3
Male	17	56.7
Total	**30**	**100.0**



About 23.3% patients are illiterate, most of the patients (33.3%) complete their primary level, 3.3% patients complete their graduation and 10% patients complete their post-graduation.

Table 3 : Level of Education of the respondents

Level of Education	Frequency (n)	Percent (%)
Illiterate	7	23.3
Primary	10	33.3
Secondary	6	20.0
Higher Secondary	3	10.0
Graduation	1	3.3
Post-graduation	3	10.0
Total	**30**	**100.0**

Most of the patients around 36.7% were student, only 6.7% patients service holder,26.7% housewife,16.7% day labor and 13.3% patients were businessman.

Table 4: Occupational status of the respondents

Occupation	Frequency (n)	Percent (%)
Business	4	13.3
Day labor	5	16.7
Housewife	8	26.7
Service	2	6.7
Student	11	36.7
Total	30	100.0

Most of the patients (76.7%) came from rural area and only 23.3% patients came from urban.

Table 5 : Location of the respondents

Location of Address	Frequency (n)	Percent (%)
Rural	23	76.7
Urban	7	23.3
Total	30	100.0

Table 6 : Etiology of glaucoma

	Frequency (n)	Percentage (%)
Absolute glaucoma + post DLCP	1	3.3
Posttrab + IOID	2	6.7
Congenital glaucoma + post trab	1	3.3
Post trauma + RD surgery	1	3.3
ICE syndrome +post trab	1	3.3
ICE syndrome	4	13.3
PACG + NVG	1	3.3
Lasered PDR + NVG	2	6.7
POAG +post trab+pseudophakia	1	3.3
Pseudophakia + secondary glaucoma	3	10
Pseudophakia + post RD surgery	1	3.3
ROP + Post PPV	1	3.3
Post PPV+ ciliary staphyloma	1	3.3
Post repair corneal injury + RD+aphakia	1	3.3
Post SFIOL	2	6.7
Sturge weber syndrome	3	10
Viral uveitis	1	3.3
VKH +post trab with pseudophakia	1	3.3
POAG+ Post Trab with ologen	1	3.3
Post PPV with trab	1	3.3

DLCP, Diode Laser Cyclophotocoagulation; IOID, Idiopathic orbital inflammatory disease; ICE, Iridocorneal endothelial syndrome; PDR, Proliferative diabetic retinopathy, PACG-Primary angle closure glaucoma. POAG, Primary open angle glaucoma; NVG, Neovascular glaucoma; RD, Retinal detachment; PPV, Parsplana vitrectomy; SFIOL, Scleral fixation intraocular lens; IOID, Idiopathic orbital inflammatory disease; VKH, Vogt Koyanagi Harada syndrome; Trab, trabeculectomy.

Visual acuity remained stable in 33.3% eyes, improved in 30% eyes and deteriorated in 36.7% eyes.

Table 7 : Status of Visual Acuity following after Surgeries

Visual Acuity Status	Frequency	Percent
Deteriorated	11	36.7
Improved	9	30.0
Stable	10	33.3
Total	30	100.0

The preoperative mean IOP was 31.67 (±9.8) mmHg which was decreased to 12.7 (±4.0) mmHg at 3 months follow up. The preoperative LogMAR visual acuity was 1.42 (±0.72) and at 3 months follow up it became 1.37 (±0.75). Number of preoperative antiglaucoma medication was decreased from 3.17 (±0.59) to 0.17 (±0.53) at 3 months postoperatively.

Table 8 : Preoperative and 3 Months follow up

Parameters	Preoperative (n=30)	3 Months follow up (n=30)	P value
IOP	31.67 (±9.8)	12.7 (±4.0)	<0.001
LogMAR Visual Acuity	1.42 (±0.72)	1.37 (±0.75)	<0.627
AGM	3.17 (±0.59)	0.17 (±0.53)	<0.001

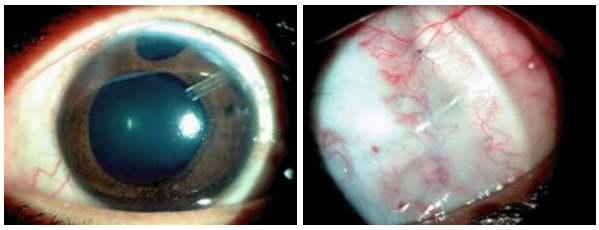


Figure : AADI tube in anterior chamber and plate in supero temporal region.

Complications included hyphaema (3.3%), choroidal detachment (3.3%) and choroidal and retinal detachment (6.6%).

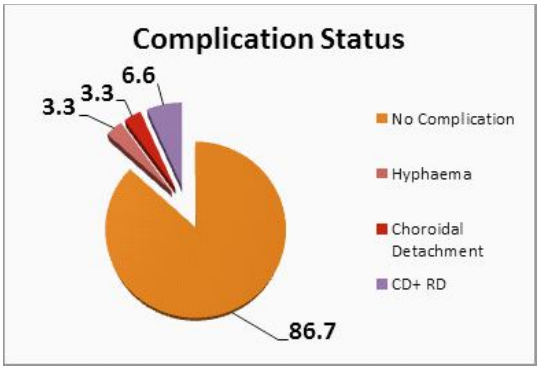


Figure : Complication Status

Discussion

Glaucoma drainage devices have been used widely in the treatment of refractive glaucoma and even as a primary glaucoma procedure.[19]

The Aurolab Aqueous Drainage Implant is a new low-cost GDD which has been recently introduced; its design is inspired by the non-valved Baerveldt Glaucoma Implant (BGI) 350 mm 2.

AADI is a valve less drainage device without any flow restrictor,[20,21]requiring intraoperative tube ligation to prevent postoperative hypotony. This results in persistence of high IOP in postoperative period until the ligation suture dissolves or is removed. Once patent, the non-valved implants achieve good IOP reduction owing to its large filtration surface area, [22] but hypotony and its resultant complications are much more common if flow is not restricted by using a suture ligature[23-25] This suture usually dissolves in 5–6 weeks postoperatively.

This prospective longitudinal study conducted at a tertiary eye hospital in Bangladesh evaluated 30 patients of refractory glaucoma treated with Aurolab Aqueous Drainage Implant. The surgeries were done by single surgeon using the same technique each time in the glaucoma department.

In our study, the mean age was 24.97 (±16.5) years, the majority of patients were female at 56.7%,with male were 13(43.3%) .The preoperative mean IOP was 31.67 (±9.8)mmHg

which was decreased to 12.7 (±4.0)mmHg at 3 months follow up. Number of preoperative antiglaucoma medication was decreased from 3.17 (±0.59) to 0.17 (±0.53) at final follow up. Our study result is differing from other study, George V. Puthuran, Paul Palmberg found the mean preoperative IOP was 34.7±9.9 mmHg with 3.2±0.7 AGMs. At 1 year, the mean IOP decreased to 15.10±6.7 mmHg with 1.51±1.1 medications[26].Another study of Sushmita Kaushik, Pankaj Kataria, IOP reduced from preoperative mean 27.4±7.5mm Hg on maximum medication (including systemic acetazolamide) to 14.6±10.74mm Hg, 13.8±7.5mm Hg, 12.8±5.6mm Hg and 14.7±5.8mm Hg at 1 week, 6 months, 1 year and 2 years postoperatively, respectively [12].

None of the patients required oral acetazolamide for control of IOP at the last follow-up. The preoperative LogMAR visual acuity was 1.42 (±0.72) and at 3 months follow up it became 1.37 (±0.75).Visual acuity remains stable in 10 (33.3%) eyes, improved in 9 (30%) eyes and deteriorated in 11 (36.7%) eyes. The most common cause for vision loss was glaucoma followed by corneal oedema or cataract. Our study differ from another study Vanita Pathak Ray, Divya P Raomedian LogMAR BCVA did not change pre and postoperatively at last follow-up; notably, none developed loss of perception of light. Approximately 70% of eyes had stable or improvement of VA.[28] A study of Sirisha Senthil showed in the AADI group, VA was same in 19 eyes (52.8%), improved in 11 eyes (30.6%), and decreased in 6 eyes (16.7%)[27].

Complete success was 90% and qualified success was 96.6%.Our study result is differing from other study,Vanita Pathak Ray and Divya P Rao they found overall success was 87.5%[28].Another study of Sushmita Kaushik ,Pankaj Kataria reported the cumulative probability of success was 91.18% at 6 months and 81.7% at 18–24 months.[12]

Complications occurred in 4 patients after AADI implant. Choroidal detachment(3.3%) due to hypotony occurred in early postoperative period, Hyphaema occurred in 1(3.3%) patient and choroidal with retinal detachment occurred in 2 (6.6%).In our study, no eyes developed other serious sight threatening complications like endophthalmitis or aqueous misdirection. A study of George V.Puthuran, Paul Palmberg reported forty-seven complications were seen in 38 eyes (24%) during the study period .During the early postoperative period (1 year) choroidal detachment was the most common complication followed by fibrinous reaction in anterior chamber and hypotony, tube occlusion was seen in 2 eyes,1 eye had retinal detachment. Delayed complications occurred in the form of corneal decompensation, graft failure, and delayed hypotony. Significant vision loss occurred in 9 eyes (5.7%) as the result of corneal decompensation (n = 3), retinal detachment (n =1), aqueous misdirection (n =1), and hypotony maculopathy (n =4).[26]

The shortcomings of this study include its small sample size and shorter follow-up period. Prospective, randomized trials with longer follow-up periods is needed to validate this technique. Despite these limitations, the surgical outcomes of this study show that valveless Aurolab Aqueous Drainage Implant is effective in lowering IOP from base line IOP.

Conclusions

We conclude that non valved low cost glaucoma drainage device is effective for controlling intraocular pressure and has the ability to be a viable low cost solution for patients with refractory glaucoma. Still further follow-up is recommended to determine failure rate.

References

1. Vanita Pathak Ray FRCS (Ed), FRCOphth 2Divya P Rao, MS.Surgical outcomes of a new low-cost non-valved Glaucoma Drainage Device in refractory glaucoma: results at one year.
2. Ramulu PY, Corcoran KJ, Corcoran SL, Robin AL. Utilization of various glaucoma surgeries and procedures in Medicare beneficiaries from 1995 to 2004. Ophthalmology. 2007;114: 2265e2270.
3. Chakravarti T. The association of socioeconomic status with severity of glaucoma and the impacts of both

factors on the costs of glaucoma medications: a cross-sectional study in West Bengal, India. J OculPharmacolTher. 2018;34:442e451.

4. Shweta G Rathi, Natasha G Seth, Savleen Kaur, Faisal Thattaruthody, Sushmita Kaushik, Srishti Raj, Surinder S Pandav, Jagat Ram A prospective randomized controlled study of Aurolab aqueous drainage implant versus Ahmed glaucoma valve in refractory glaucoma: A pilot studyWebsite: www.ijo.in DOI: 10.4103/ijo.IJO_427_18
5. Christakis PG, Zhang D, Budenz DL, et al. Five-year pooled data analysis of theAhmedBaerveldt comparison study and the Ahmed versusBaerveldt study. Am J Ophthalmol. 2017;176:118e126.
6. Christakis PG, Kalenak JW, Tsai JC, et al. The Ahmed Versus Baerveldt study: five-year treatment outcomes. Ophthalmology. 2016;123:2093e2102.
7. Budenz DL, Barton K, Gedde SJ, et al. Five-year treatment outcomes in the Ahmed Baerveldt comparison study. Ophthalmology. 2015;122:308e316.
8. Pathak Ray V, Rao DP. Surgical outcomes of a new affordable non-valved glaucoma drainage device and Ahmed glaucoma valve: comparison in the first year. Br J Ophthalmol. 2018 June 26. pii: bjophthalmol-2017-311716 https://doi.org/10. 1136/bjophthalmol-2017-311716 [Epub ahead of print].
9. Pathak Ray V, Rao DP. Surgical outcomes of a new low-cost nonvalved glaucoma drainage device in refractory glaucoma: results at 1 year. J Glaucoma. 2018;27:433e439.
10. Rathi SG, Seth NG, Kaur S, et al. A prospective randomized controlled study of Aurolab aqueous drainage implant versus Ahmed glaucoma valve in refractory glaucoma: a pilot study. Indian J Ophthalmol. 2018;66:1580e1585.
11. Rao DP, Pathak-Ray V. Combined cataract extraction with a new nonvalved glaucoma drainage device in adult eyes with cataract and refractory glaucoma. Indian J Ophthalmol. 2018;66:1278e1283.
12. Sushmita Kaushik, Pankaj Kataria, Srishti Raj, Surinder Singh Pandav, Jagat Ram. Safety and efficacy of a low-cost glaucoma drainage device for refractory childhood glaucoma .Kaushik S, et al. Br J Ophthalmol 2017;101:1623–1627. doi:10.1136/bjophthalmol-2017-310276 1623
13. Kaushik S, Kataria P, Raj S, Pandav SS, Ram J. Safety and efficacy of low cost glaucoma drainage devices for refractory childhood glaucoma. Br J Ophthalmol 2017;101:1623 27.
14. Ray VP, Rao DP. Surgical Outcomes of a New Low Cost Nonvalved Glaucoma Drainage Device in Refractory Glaucoma: Results at 1 Year. J Glaucoma 2018;27:433 9.
15. Christakis PG, Kalenak JW, Tsai JC, Zurakowski D, Kammer JA, Harasymowycz PJ, et al. The Ahmed VersusBaerveldt Study: Five-Year Treatment Outcomes. Ophthalmology. 2016;123(10):2093- 102
16. Schwartz AL and Anderson DR. Trabecular surgery. Arch Ophthalmol1974; 92(2): 134–138.
17. Molteno AC: New implant for drainagein glaucoma: clinical trial. Br J Ophthalmol1969; 53: 606–615
18. Pathak Ray V, Rao DP. Surgical outcomes of a new low-cost non-valved glaucoma drainage device in refractory glaucoma: results at one year. J Glaucoma. 2018;27:433–439.
19. Reji Philip, PremanandChandran, NabeedAboobacker, MrunaliDhavalikar, Ganesh V Raman Intermediate term outcome of Aurolab aqueous drainage implant Website: www.ijo.in DOI: 10.4103/ijo.IJO_675_18
20. Lloyd MA, Baerveldt G, Fellenbaum PS, Sidoti PA, Minckler DS, Martone JF, et al. Intermediate term results of a randomized clinical trial of the 350 versus the 500 mm2 Baerveldt implant. Ophthalmology 1994;101:1456 63.
21. Krishna R, Godfrey DG, Budenz DL, Escalona Camaaño E, Gedde SJ, Greenfield DS, et al. Intermediate term outcomes of 350 mm(2) Baerveldt glaucoma implants. Ophthalmology 2001;108:621 6.
22. Roy S, Ravinet E, Mermoud A. Baerveldt implant in refractory glaucoma: Long term results and factors influencing outcome. IntOphthalmol 2001;24:93 100
23. Budenz DL, Barton K, Feuer WJ, Schiffman J, Costa VP, Godfrey DG, et al. Ahmed Baerveldt Comparison Study Group. Treatment outcomes in the Ahmed Baerveldt Comparison Study after 1 year of follow up. Ophthalmology 2011;118:443 52.
24. Christakis PG, Tsai JC, Zurakowski D, Kalenak JW, Cantor LB, Ahmed II. The Ahmed versus Baerveldt study: Design, baseline patient characteristics, and intraoperative complications. Ophthalmology 2011;118:2172 9.
25. Seah SK, Gazzard G, Aung T. Intermediate term outcome of Baerveldt glaucoma implants in Asian eyes. Ophthalmology 2003;110:888 94
26. George V. Puthuran, MS, Paul Palmberg, MD, HiruniKaushalyaWijesinghe, MS, Subbaiah R. Krishnadas, DNB,Alan Robin, MD.Intermediate-Term Outcomes of an Affordable Aqueous Drainage Implant in Adults with Refractory Glaucoma. Ophthalmology Glaucoma 2019;2:258-266 ª 2019 by the American Academy of Ophthalmology.
27. SirishaSenthil, MS, FRCS,1 SriRamaniGollakota, DNB,1 Mohammad Hasnat Ali, MBA,2 KiranmayeTuraga, MS,3 SwathiBadakere, MS,1 Rashmi Krishnamurthy, DNB,1 Chandra S. Garudadri, MD, FRCS. Comparison of the New Low-Cost Nonvalved Glaucoma Drainage Device with Ahmed Glaucoma Valve in Refractory Pediatric Glaucoma in Indian Eyes. Ophthalmology Glaucoma 2018;1:167- 174 ª 2018 by the American Academy of Ophthalmology.
28. Vanita Pathak Ray, FRCS (Ed), FRCOphth* and Divya P. Rao, MS†.Two-Year Outcomes of the New Low-cost NonvalvedAurolab Aqueous Drainage Implant in Refractory Glaucoma(J Glaucoma 2020;29:767–772).

Comparison of intraocular pressure between air puff tonometer and Goldmann applanation tonometer at a tertiary eye care centre

U S Akbar[1], S M Noman[2], S Biswas[3]

Abstract:

Purpose : The purpose of this study was to evaluate the role of air puff (AP) tonometer by comparing the measurements of intraocular pressure (IOP) made using this device with those made using a Goldmann applanation tonometer (GAT) at Chittagong Eye Infirmary and Training Complex.

Methods : An observational and comparative study was carried out at Chittagong Eye Infirmary and Training Complex from January 2016 to January 2017. Two techniques for IOP measurements using the standard GAT and the non-contact tonometer (NCT) were compared. A total of 400 eyes from 200 patients were included in the study.

Results : The mean IOP as measured by GAT in the right eye was 14.50±5.59mmHg and in the left eye was 14.87±7.03mmHg while that as measured by NCT in the right eye was 15.97±6.12mmHg and in the left eye was 15.94±6.98mmHg. The mean difference between the two methods of measurement in the right eye was 1.47±0.53mmHg and the left eye was 1.07±0.05mmHg. The readings obtained by NCT were higher than those obtained by GAT.There was no statistically significant difference found in IOP measurements between GAT and NCT according to patient's age, gender or laterality of eyes.

Conclusion : There was a significant difference in the measurement of IOP between GAT and NCT.Goldmann applanation tonometry remains the most suitable and reliable method for measuring IOP.

Keywords : Intraocular pressure, air-puff tonometer, Goldmann applanation tonometer.

Introduction

Glaucoma is the second leading cause of irreversible blindness worldwide.[1] In the developed and developing countries, a significant proportion of glaucoma usually presents to eye care facilities in the advanced stages when the optic nerve is already damaged.[2,3]

Screening for glaucoma based solely on an IOP>21mmHg may miss up to half of the people with glaucoma in the screened population. However, IOP is still seen as a very important risk factor for the development of glaucomatous damage. Although other risk factors affect an individual's susceptibility to glaucomatous damage, IOP is the only risk factor that can be altered at this time.[4]

Applanation tonometry is based on the Imbert–Fick principle, which states that a perfect sphere has its internal pressure equally distributed and that the external force needed to flatten a known area of that sphere is directly proportional to the internal pressure of the sphere.[5]

The Goldmann applanation tonometer (GAT) is currently the most popular tonometer available. It consists of a double prism mounted on a standard slit lamp. The GAT represents the gold standard for IOP measurement. With the GAT, the force required to flatten, or applanate, a constant area of the cornea is measured and related to the IOP using the Imbert–Fick principle. The GAT uses an applanation diameter of 3.06 mm and is performed with the patient seated at the slit lamp.[6]

Air-puff tonometry is an applanation method using a standardized puff of air to flatten the cornea. This method has the advantage that no topical anesthetic or risk of corneal abrasion is involved.[7]The system consists of a central air plenum flanked either side by a light emitter and a light detector. As the pressure of the air pulse directed to the cornea increases to deform the cornea, the corneal surface behaves like a plane

Authors Information :

[1]Dr. Umme Salma Akbar, Associate Consultant, Chittagong Eye Infirmary and Training Complex

[2]Dr. Shams Mohammed Noman, Associate Professor, Bangabandu Sheikh Mujib Medical University

[3]Dr. Shally Biswas, Senior Assistant Surgeon, Chittagong Eye Infirmary and Training Complex

mirror, reflecting light to the detector. Corneal applanation is measured by collecting light reflected from the central cornea.[8]

The purpose of this study was to compare the IOP with an air puff tonometer and a Goldmann applanation tonometer at Chittagong Eye Infirmary and Training Complex.

Methods

An observational and comparative study was conducted on patients who presented to the Glaucoma clinic of Chittagong Eye infirmary and Training Complex from January 2016 to January 2017.

Exclusion criteria included patients having previous surgical intervention,one-eyed patients, traumatic cases, non-cooperative patients, those with severe visual loss and children less than 8 years of age.

Demographic data were documented and statistical analysis was conducted using SPSS 16.

The research follows the tenets of the Declaration of Helsinki, and each patient gave his or her informed consent to participate in this study. In case of children, informed consent from their guardians was obtained.

The medical devices used in the study were the NCT Huvitz HNT 7000 and the GAT HS Haag-Streit Diagnostics. For the examination, topical anaesthetic eye drops (5 mg/mL proxymetacaine hydrochloride) were used. The medical equipment was calibrated prior to the examination.

The IOP of both eyes of each patient were evaluated, first on the right and then on the left and each eye was used as one isolated data. The NCT measurement was always performed before the GAT measurement to eliminate the effect of ocular massage, which has been described when using the GAT and is absent with the NCT.[9]

Each assessment was conducted by a different optometrist who was completely unaware about the findings by the previous assessment.

Results

The study population comprised of 400 eyes from 200 patients. It included 128 males and 72 females with an age range of 8-85 years, and mean age was 49.75±17.04 years.

The data collected was classified into three groups according to the IOP measurements by GAT and NCT: Group 1, IOP < 12 mmHg: Group 2, IOP 12-24 mmHg; and Group 3, IOP > 25mmHg. The differences in readings were calculated. The data were also classified according to the patient's age, gender and laterality.

The data were analyzed using SPSS 16.

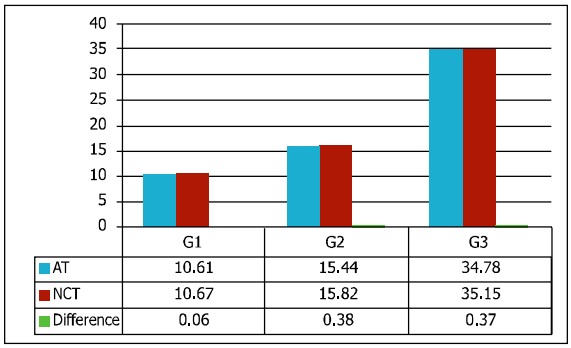
The mean IOP value as measured by GAT in the right eye was 14.50±5.59 mmHg, with a range of 2-46 mmHg and the left eye was 14.87±7.03 mmHg, with a range of 2-54 mmHg.

The mean IOP value as measured by NCT in the right eye was 15.97±6.12 mmHg, with a range of 3-48 mmHg and the left eye was 15.94±6.98 mmHg, with a range of 4-55 mmHg.

The mean difference of IOP values between GAT and NCT measurements in the right eye was 1.47±0.53mmHg and in the left eye was 1.07±0.05mmHg.

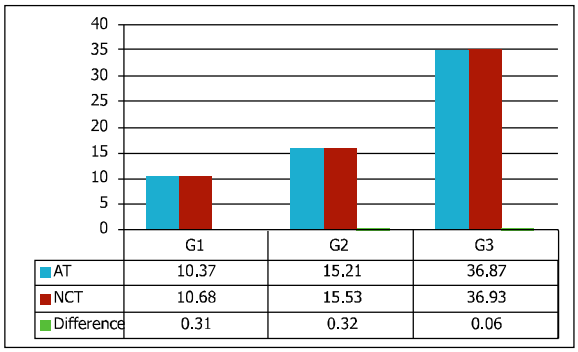
The difference in IOP values between the two devices was statistically significant (P=0.0001).

This study showed that IOP values measured with NCT were higher than those measured with GAT (Figures 1 and 2).



	G1	G2	G3
AT	10.61	15.44	34.78
NCT	10.67	15.82	35.15
Difference	0.06	0.38	0.37

Right eyes in study:mean IOP as measured by GAT, mean IOP as measured by NCT and the difference between the two readings according to three groups of IOP values (Group 1[G1], <12mmHg; Group 2[G2], 12-24mmHg and Group 3[G3],>24mmHg).



	G1	G2	G3
AT	10.37	15.21	36.87
NCT	10.68	15.53	36.93
Difference	0.31	0.32	0.06

Left eyes in study: mean IOP as measured by GAT, mean IOP as measured by NCT and the difference between the two readings according to three groups of IOP values (Group 1[G1], <12mmHg; Group 2[G2], 12-24mmHg and Group 3[G3],>24mmHg).

Discussion

In the majority of ophthalmic institutes, GAT is the most commonly used and reliable instrument. In addition, it is still considered the gold standard for assessment of IOP.[10]

This study showed there was a significant difference in measurements of IOP between GAT and NCT. The readings obtained by NCT were higher than those obtained by GAT in this study.

Shah et al. study 2012 reported a significant difference between the mean IOP assessed by GAT and air puff tonometry.[11]

Popovich and Shields evaluated 421 eyes and reported that the air puff was a reliable measurement compared to the GAT within the normal range of IOP. This fact is rarely supported in most of the published studies, where the majority of reports suggest that the GAT is the most consistent method of IOP assessment.[12]

Several other studies have compared IOP measurements obtained with GAT and those obtained by non-contact tonometers. Firat et al's study concluded that non-contact tonometer measurements were higher than those obtained by GATs and that this difference was statistically significant.[13]

There was no statistically significant difference found in IOP measurements between GAT and NCT according to patient's age, gender or laterality of eyes.

Conclusion

The GAT remains the most reliable device and is the international gold standard for measuring IOP. Measurements of IOP by NCT are usually higher than those obtained by GAT regardless of the patient's age, gender and laterality of eyes.

Conflict of Interest

The author reports no conflict of interest.

Acknowledgement

Chittagong Eye Infirmary and Training Complex

References

1. Kingman S. Glaucoma is second leading cause of blindness globally. Bull World Health Organ.2004;82:887-8.
2. Cook C. Glaucoma in Africa: Size of the problem and possible solutions. J Glaucoma. 2009;18:124-8.
3. Saw SM, Gazzard G, Friedman D, Foster PJ, Devereux JG, Wong ML, et al. Awareness of Glaucoma, and health beliefs of patients suffering primary acute angle closure. Br J Ophthalmol. 2003;87:446-9.
4. American Academy of Ophthalmology. Practicing Ophthalmologists Curriculum: Glaucoma, basic and clinical science course; 2007-2008. San Francisco, CA: American Academy of Ophthalmology; 2007:22-25.
5. Benjamin WJ, editor. Borish's Clinical Refraction, 2nd ed. Butterwoth-Heinemann;2006:501-503.
6. Morrison JC, Pollack IP, editors. Glaucoma Science and Practice. New York, NY: Thieme Medical Publishers; 2003:60-64.
7. Crick RP, Khaw PT. A Textbook of Clinical Ophthalmology: A Practical Guide to Disorders of the Eyes and Their Management, 3rd ed. Singapore: World Scientific; 2003:557.
8. Weinreb RN, Brandt JD, Garway-Heath DF, Medeiros FA, editors. World Glaucoma Association : Intraocular Pressure; Consensus Series 4. The Hague, The Netherlands: Kugler Publications; 2007:22-23.
9. McCafferty SJ, Levine J, Schwiegerling J, Enikov ET. Goldmann applanation tonometry error relative to true intracameral intraocular pressure in vitro and in vivo. BMC Ophthalmol. 2017;17:2015.
10. Essam A. Osman, Priscilla W. Gikandi, Abdul-Rahman A. Al-Jasser, Majeedah Alotaibi, Ahmed Mousa. Comparison of Goldmann Applantion, Noncontact Air Puff and Tono-Pen XL Tonometry in Normal Controls versus Glaucoma patients at a University Hospital in Riyadh, Saudi Arabia. Middle East Afr J Ophthalmol. 2018 Jan-Mar; 25(1): 8-13.
11. Shah MA, Bin Saleem K, Mehmood T. Intraocular pressure measurement: Goldmann applanation tonometer vs. non contactairpuff tonometer. J Ayub Med Coll Abbottabad. 2012;24:21-4.
12. Popovich KS, Shields MB. A comparison of intraocular pressure measurements with the XPERT noncontact tonometer and Goldmann applanation tonometry. J Glaucoma. 1997;6:44-6.
13. Firat PG, Cankaya C, Doganay S, et al. The influence of soft contact lenses on the intraocular pressure measurement. Eye (Lond). 2012;26(2):278-282.

Surgical outcome of combined Phaco-trabeculectomy versus small-incision cataract surgery with trabeculectomy- A prospective comparative study

T R Chhara[1], M J Kabir[2], B K Sarker[3], Z Hassan[4], A R Khan[5], S Manjur[6]

Abstract

Purpose : To compare the outcomes of combined phacoemulsification and trabeculectomy with small-incision cataract surgery (SICS) and trabeculectomy in patient of primary glaucoma with significant cataract.

Methods : In this prospective, randomized, comparative study 60 eyes of primary glaucoma were allocated for either Phaco-trabeculectomy (30 eyes) or Small incision cataract surgery (SICS) with trabeculectomy (30 eyes). The patients were followed up for 3 months postoperatively and evaluated for intraocular pressure (IOP), best corrected visual acuity (BCVA), number of anti-glaucoma medications and adverse events. Complete success was defined as an IOP 21mmHg, with no additional glaucoma medications. Relative success was defined as an IOP 21mmHg but with additional glaucoma medications.

Results : The overall success rates (with or without medication IOP 21 mmHg) was 100% (30 eyes) in Trab-Phaco group and 93.3% (28 eyes) in Trab-SICS group. Postoperative mean IOP in Trab-Phaco group was 11.67 (±2.83) and in Trab-SICS group was 11.47 (±5.25) after 3 months follow up. Improvement in visual acuity was significantly high in Trab-Phaco group with 80% patients and 53% patients in Trab-SICS group attaining a final visual acuity of 6/9 or better. Number of post-operative complications were more in Trab-SICS group. The most common early post-operative complications were fibrinous AC reaction.

Conclusions : There was no statistically significant difference in the IOP control between Trab-Phaco and Trab-SICS groups. Our results suggest that postoperative vision recovery is little higher in Trab-Phaco group.

Keywords : Phacoemulsification - trabeculectomy - combined surgery - cataract -glaucoma

Authors Information :
[1]Dr. Tania Rahman Chhara, Consultant, Ispahani Islamia Eye Institute & Hospital
[2]Dr. Md. Jahangir Kabir
[3]Dr. Bipul Kumer Sarker
[4]Dr. Zafrul Hassan, Consultant, Lions Eye Hospital
[5]Dr. Anisur Rahman Khan
[6]Dr. Salma Manjur
[1,2,3,5,6]Consultant, Ispahani Islamia Eye Institute & Hospital

Introduction

Trabeculectomy is often performed as a primary procedure with cataract extraction and implantation of an intraocular lens (IOL) (Triple procedure).[1] Various techniques have been used that is cataract extraction and trabeculectomy using corneoscleral incision or more recently, phacoemulsification and trabeculectomy for combined surgical procedure.[2,3]

Manual small-incision cataract surgery with trabeculectomy is an acceptable option in the surgical management of combined cataract and glaucoma uncontrolled with maximum-tolerated medical therapy, especially where phacoemulsification has a limitation of a long learning curve, where there is machine dependency and when it is relatively difficult in situations like hard cataract, small pupil.[4]

Recently there has been a widespread shift to use combined phaco-trabeculectomy as a treatment of choice for concurrent cataract and glaucoma. Combined phaco-trabeculectomy is as safe and effective in controlling IOP as trabeculectomy alone. But combined procedure has been associated with more postoperative complications compared to phacoemulsification alone. Phaco-trabeculectomy can be done through single site, where both phacoemulsification and trabeculectomy are performed from the same site. The second option is through two site surgery, by performing a temporal phacoemulsification and a superior trabeculectomy.

Different studies showed phaco-trab has the advantage of early visual rehabilitation over the extra capsular combined procedures. But there is little in the literature to suggest that any of the combined procedure is superior to the others in terms of IOP control and post-operative medication .[5]

The aim of this study is to compare the relative efficacy of the two combined techniques in controlling IOP and improving vision in a group of patients with coexisting cataract and glaucoma.

Methods

This is a prospective randomized comparative study and was conducted at the glaucoma department of IspahaniIslamia Eye Institute and Hospital, Bangladesh and was approved by institutional review board. Total 60 eyes of 58 patients with primary glaucoma coexist with grade 2 nuclear sclerosis (NS-II) cataract were included in the study. Patients with any signs of secondary glaucoma were excluded from the study. All the subjects were explained the benefits and risks of the procedure before obtaining an informed consent.

After enrollment, patients were randomized into one of the two groups. Trabeculectomy with Phacoemulsification will be group1 (Trabphaco group) and Trabeculectomy with Small incision cataract extraction (SICS) (Trab-SICS group) will be group2.Peribulbar block was given and superior rectus bridle suture was placed and all the patients received superior subconjunctival injection of 0.2mg/ml of MMC for 2 minutes.

In Trabphaco group, all patients (30 eyes) underwent temporal phacoemulsification and superior trabeculectomy, that means two site surgery. A fornix-based conjunctival flap was lifted and the sclera was treated with light surface cautery. A triangular 5 mm vertically and 4 mm horizontally of ¾th partial depth scleral incision was made by 15^0 keratome and sclera flap was created with crescent knife which extended 1mm into the clear cornea. In temporal side 2.8 mm keratome was used to enter the anterior chamber at the cornea through which the phacoemulsification by routine stop and chop procedure was performed. Following implantation of the foldable IOL, a 2.00 mm × 2.00 mm deep block of sclera tissue was excised from trabeculectomy site and peripheral iridectomy was performed. The external scleral incision was secured with 8-0 nylon suture, 3 in number one at apex and two at base of triangle on both sides. The conjunctiva was re-apposed at the limbus using a 10-0 vicryl suture at both ends.

In Trab-SICS group, all patients (30 eyes) underwent superior trabeculectomy and cataract extraction. A fornix based conjunctival flap was made and a triangular sclera flap (5.5 X 5.5 mm) was lifted. 3.2mm keratome was used to enter the anterior chamber and after CCC, tunnel was extended by 5.2 keratom and lens was delivered through corneoscleral tunnel. Following implantation of non-foldable IOL, a 2.00mm X 2.00mm deep sclerotomy was done and peripheral iridectomy performed. Scleral flap was closed by 3 sutures and conjunctiva was re-apposed at the limbus.

Inferior fornix sub conjunctival injection of dexamethasone and gentamycin was given in all patients.

Post-operatively all patients were treated with topical steroid, antibiotic and cycloplegic. Total ophthalmic examination was done on first post-operative day and then one week, one month and three months after operation.If post-operative IOP measurement were more than 21 mmHg after topical steroid withdrawal, an IOP-lowering medication was added.Correlation of statistical analysis was considered significant at P value <0.05.

Results

Table 1: Demographic and preoperative clinical features of Group 1 (Trab-Phaco) and Group 2 (Trab-SICS)

Parameters	Group 1 (n=30)	Group 2 (n=30)	*P* value
Age	59(38-75)	55(37-75)	
Male: Female	16:14	8:22	
Preoperative IOP	17.63±8	27.43±12	0.001
Preoperative Log MAR			
Visual acuity	0.5200±0.37	0.7167±0.44	0.070
Preoperative no of			
AGM	2.23±0.81	2.60±0.62	0.055
POAG: PACG	19:11	1:29	0.001

The patient demographics are shown in Table 1. There are significant differences in termsof male:female ratio and POAG:PACS ratio between two groups. There are statistically significant differences in preoperative IOP and number of

anti-glaucoma medication used preoperatively. The mean preoperative IOP was 17.6±8 mmHg in Trab-Phaco group and was 27.4±12 mmHg in Trab-SICS group.

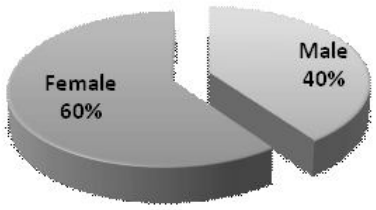


Figure - 1 : Total Male : Female

Figure-1:Is showing male female ratio (24:36) of total patients (n=60).

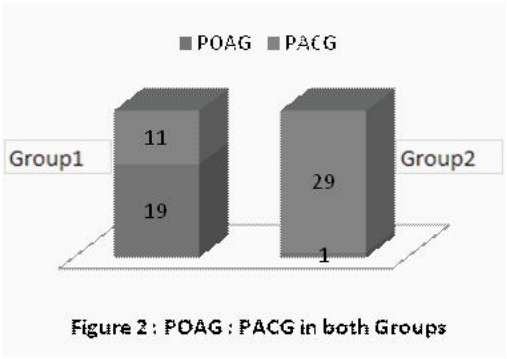


Figure 2 : POAG : PACG in both Groups

Figure-2: is showing POAG and PACG ratio in both groups. In Trabphaco group it was 19:11 and in Trab-SICS group it was 1:29.

Table 2: Post-operative features in two groups

	Group 1 (n=30)	Group 2 (n=30)	*P* value
IOP at 1 month (mmHg)	12.20±2.5	11.26±2.8	0.333
IOP at 3 months (mmHg)	11.67±2.8	11.47±2.7	0.855
BCVA at 1 month			
(Log MAR)	0.1433±0.16	0.4267±0.41	0.001
BCVA at 3 months			
(Log MAR)	0.1533±0.16	0.3800±0.39	0.006
No of AGM	0.20±0.61	0.18±0.61	0.894

Tables 2 demonstrate that mean IOP decrease to 11.6±2.8 mmHg in Trab-Phaco group and 11.4±2.7 mmHg in Trab-SICS group. Also demonstrate significant improvement in BCVA in Trab-Phaco group at both 1 month and 3 months postoperatively.

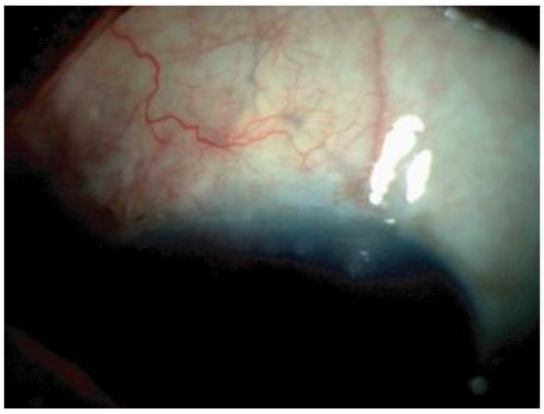


Figure-3 : 3 months Post-Operative Photograph following trabeculectomy with phacoemulsification

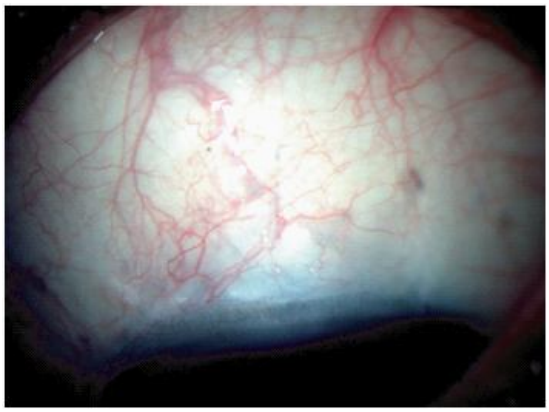


Figure-4 : 3 months Post-Operative Photograph following trabeculectomy with SICS

Table 3: Postoperative early complications of two groups

	Group 1 (n=30)	Group 2 (n=30)
Hypotony	0	1(3.3%)
Shallow AC	2(6.6%)	3(10%)
AC reaction	5(16.6%)	8(26.6%)
Choroidal detachment	0	1(3.3%)
Malignant glaucoma	0	1(3.3%)
PCO	0	1(3.3%)

Table 3 provides an overview of the recorded early postoperative complications. The complications included hypotony, transient anterior chamber inflammation, choroidal detachment, malignant glaucoma and PCO. AC reaction was more frequent in Trab-SICS group.

Discussion

Trabeculectomy combined with cataract surgery is considered a safe, effective and economical

strategy in the management of cataract associated with glaucoma. There was weak evidence for phacoemulsification lowering more IOP than nucleus expression (SICS) practiced in developing countries.[3,4,13] Phacoemulsification with foldable lens has the advantage of smaller incision and earlier visual rehabilitation, but for the developing countries, the increased cost is a major hurdle.[6,7] Hence, we decided to compare the outcomes of trabeculectomy combined with SICS or Phacoemulsification in this study.

In our study mean age were 59 years and 55 years in Trabphaco and Trab-SICS group respectively. Male: female ratio was 24: 36 (n=60). Among 60 eyes 20 (33.3%) eyes were POAG and 40 (66.7%) eyes were PACG case. R Khandelwal, D Raje, A Rathi and et al also found 50 cases of PACG among 75 eyes in their study.[6] The advanced glaucoma due to PACG remains asymptomatic (chronic angle closure) in many Asian countries and are detected accidently at the time of cataract surgery. Combining cataract surgery with trabeculectomy has additional pressure benefit in such patients.

The overall success achieved (IOP 21 mmHg) without or with medication is 100% (30) in Trabphaco group and is 93.3% (28) in Trab-SICS group at 3 months follow up, which is better than study results done by Mittal S, Mittal A, Ramakrishnan R which was 92.3% and 89.1% respectively at three year follow up.[4]

Preoperative mean IOP in both Trabphaco and Trab-SICS group was 17.63(±8.4) and 27.43(±12.2) mm Hg respectively. Postoperative mean IOP in both Trabphaco and Trab-SICS groups at 1 month follow up is 12.20(±2.5) and 11.26(±2.8) mm Hg respectively (P= 0.333) and at 3 months follow up is 11.67(±2.8) and 11.47(±2.7) (P= 0.855), which is significantly reduced from preoperative IOP in both groups but in comparison between two groups more IOP reduction found in Trab-SICS group. Our study result is differing from other study. Chen H, Ge J, Liu X et al found postoperative IOP in Trabphaco group was 12.63(±4.6) and Trab-SICS group was 13.01(±5.2).[3]

In term of percentage of IOP reduction from base line IOP at final follow up it is >34% in Trabphaco group and >58% in Trab-SICS group, which is also not matching with other study results described earlier (92.3% in Trabphaco group and 89.1% in Trab-SICS group).[4]

Preoperative visual acuity was 0.5200 (±0.37) in Trabphaco group and 0.7167(±0.44) in Trab-SICS group (in Log MAR). Postoperative BCVA at 1 month follow up in both Trabphaco and Trab-SICS groups are 0.1433(±0.16) and 0.4267(±0.41) respectively (P=0.001). And at 3 months follow up are 0.1533(±0.16) and 0.3800(±0.39) respectively (P=0.006). There is significant different between two groups. Our study suggested that postoperative early visual recovery is better in Trabphaco group. At final follow up visual acuity 0.3 (equivalent to 6/12) is achieved in 90% (27 eyes) and 77% (23 eyes) which is also supported by other study done by Chen H, Ge J, Liu X, Lu F, they found 43.5% in Trabphaco group and 32.4% in Trab-SICS group.[1,3,4,13]

Preoperative number of anti-glaucoma medications was 2.23 (±0.81) in Trabphaco group and 2.60 (±0.62) in Trab-SICS group, P=0.55. Postoperative number of anti-glaucoma medications is 0.20 (±0.61) and 0.18 (±0.61) respectively, P=0.894. There is no statistically significant difference between two groups. Study done by Anand N, Menage M. J, Baily C, support our study, they also found non-significant difference between two groups (20.9% and 22.9% accordingly).[5,6]

In our study the total number of post-operative complications are 7 (23.3%) in Trabphaco group and 15(50%) in Trab-SICS group. The most common complications are fibrinous anterior chamber reaction (5 and 8) in both groups. The more serious complications (hypotony, choroidal detachment, malignant glaucoma) are found in Trab-SICS group. In previously mentioned study the total number of postoperative complications (68.5% Vs 89%) were also significantly higher in the Trab-SICS group.[2,4,5] In our study, none of the patients had bleb-related complications or endophthalmitis, although in all of the patients intraoperative MMC was used, possibly due to

small sample size and shorter follow-up period. In the Collaborative Initial Glaucoma Treatment Study of 285 trabeculectomy patients, the risk of endophthalmitis after 7 years was reported to be 1.1% (n=3), and there were 14% patients (n =40) requiring bleb revision. They found blebitis (n=8), bleb leak (n=15), and hypotony (n=4) in their study cases.[12]

The shortcomings of this study include its small sample size and shorter follow-up period. Prospective, randomized comparative trials with longer follow-up periods, including bleb morphology, are needed to validate this technique. Despite these limitations, the surgical outcomes of this study show that trabeculectomy combined with phacoemulsification or small incision cataract surgery (SICS) is effective in lowering IOP from base line IOP. But in term of percentage of reduction, more IOP reduction found in Trab-SICS group with more complications rate than Trabphaco group. And post- operative early visual recovery observed in Trabphaco group.

Conclusion

Trabeulectomy combined with small incision cataract surgery is more effective in term of IOP reduction. Trabphaco results in early visual rehabilitation with fewer incidences of post-operative complications. There is no significant difference in the number of anti-glaucoma medications needed after surgery.

References

1. Usha B.R, Usha M.S, Brinda P. Outcome of conventional Trabeculectomy with or without cataract surgery. IJCRR. Section: healthcare, sci. journal impact factor 4.016.
2. Khandelwal R, Raje D, Rathi A, Agashe A, Majumdar M. Surgical outcome of safe surgery system trabeculectomycombind with cataract extraction. Eye (Lond), 2015 mar, 29(3): 363-70.
3. Chen H, Ge J, Liu X, Lu F. The clinical analysis of 260 combined surgery glaucoma and cataract. 2000 Jun, 16(2): 102-5. [Peb Med]
4. Mittal S, Mittal A, Ramakrishnan R. Safety and efficacy of manual small-incision cataract surgery combined with trabeculectomy: comparison with phacotrabeculectomy. Asian J Ophthalmol. 2008; 10:221–229.
5. Anand N, Menage M.J, Baily C. Phacoemulsification trabeculectomy compared to other methods of combined cataract and glaucoma surgery. ACTA OphthalmologicaScandinavica 1997.
6. Kirti S, Ankush M, Pooja J. A comperative evaluation of phacotrabeculectomy with manual phacofracturetrabeculectomy. Department of ophthalmology, Guru Nanak Eye Center, Maulana Azad Medical Collage, New Delhi, India. DOI- 10.4103/2394-7438.150050. Web publication 27 Jan-2015.
7. Thomas R, Parikh R, Muliyil J. Comparison between phacoemulsification and Bluementhal technique of manual small- incision cataract surgery combined with trabeculectomy.
8. Khurana AK, Chawla U, Passi N at al. A comperative study of combined small incision cataract suegery with suturelesstrabeculectomy versus trabeculectomy using W-shaped incision. Nepal J Ophthalmol 2011; 3 (5): 13-18.
9. Raquel R, Rachel A, Tripper S, Juan F. The safety and efficacy of two-site phacotrabeculectomywith mitomycin-C under underretrobulber and topical anesthesia. JOCGP. 10.5005/jp- journal- 10008-1196.
10. Wishart PK, Austin MW. Combined cataract extraction and trabeculectomy: phacoemulsification compared with extracapsular technique. Ophthalmic surg 24:814-821.
11. Papapanos P, Wedrich A, Pfleger T, Menapace R. Induced astigmatism following small incision cataract surgery combined with trabeculectomy. DOC Ophthalmol 1993; 82:361-368.
12. Zahid S, Musch DC, Niziol LM, Lichter PR. Collaborative initial glaucoma treatment study group risk of endophthalmitis and other long term complications of trabeculectomy in the collaborative initial glaucoma treatment study group. AMJ Ophthalmol. 2013;155(4):674-680.
13. Bowman RJ, Hay A, Wood ML, Murdoch IE. Combined cataract and trabeculectomy surgery for advanced glaucoma in East Africa; visual and intraocular pressure outcomes. Eye. 2010;24 (4:573–577. [PubMed]

ND Yag Laser Peripheral Iridotomy- the First Line of Treatment in Primary Angle Closer Disease(PACD), A Study of 100 Cases

S Parvin[1], M A Mian[2], Z S Shahid[3]

Abstract

Background: Primary angle-closure disease (PACD) has been identified as a major cause of blindness around the world, particularly in Asian countries. Laser peripheral iridotomy is an important part of PACD management.

Objective: The main goal of this study is to do prophylactic peripheral Iridotomy (PI) to patients having PACD to prevent the sudden IOP rise by pupil block.

Method: This prospective observational study was conducted from 7th March 2018 to 9th March 2022 among 100 patients in Bangladesh Eye Hospital, Shantinagar Ltd, Dhaka, Bangladesh. Data were collected on the basis of the clinical record and associated changes.

Results: In this study, maximum patients (40%) were from 51 to 60 years old, and minimum number (5%) of patients were more than 70 years and 40 or less than 40 years. 42 (70%) patients were female and 18 (30%) were male. Maximum patients (63%) had PACG followed by 17% patients had PAC and 20% patients had PACS. Maximum patients (46) had 11-15 mmHg IOP at presentation followed by (7) had 10 or less than 10 mmHg, (25) had 16-21 mmHg and (22) had more than 21 mmHg.86 patients disease were stabilized and it progressed in 14 patients. 20% patients had bleeding from laser site during procedure, which effectively stopped by pressing the cornea with Abraham lens over the eyes and 1 patient had corneal burn.

Conclusion: Primary angle closure in eyes can be treated safely and effectively with ND Yag laser peripheral iridotomy. YAG laser iridotomy offers effective, long lasting, first line treatment for the management of Primary Angle Closure Diseases. Laser iridotomy widens drainage angle and prevent sudden rise of IOP due to pupil block. The follow-up of fellow eyes of patients with PACD, close monitoring is still recommended.

Authors Information :

[1]Dr. Salma Parvin, Glaucoma Specialist & Phaco Surgeon, Bangladesh Eye Hospital, Shantinagar Ltd, Dhaka, Bangladesh.

[2]Prof. Md. Arif Mian, Glaucoma Specialist & Phaco Surgeon, Bangladesh Eye Hospital, Shantinagar Ltd, Dhaka, Bangladesh.

[3]Prof. Zakia Sultana Shahid, Glaucoma Specialist & Phaco Surgeon, Anwer Khan Modern Medical College, Dhaka, Bangladesh.

Keywords : Yag Laser, Peripheral Iridotomy, Primary Angle closer Disease.

Introduction

Glaucoma is one of the leading causes of irreversible blindness globally. Narrow Angle Glaucoma or Closed Angle Glaucoma (ACG) is one of the varietiesof primary glaucoma, which is prevalent in South Asia. It was seen that Primary Angle Closer Disease (PACD) is an anatomical predisposition. Iridocorneal adhesion(PAS), chronic rise of Intra Ocular Pressure (IOP) and glaucomatous optic neuropathy are the sequence of progression for PACD. Common risk factors for PACD include Asian descent, hypermetropia, older age, female gender, short axial length, and thick & anteriorly positioned crystalline lens.

European Glaucoma Society Classification of primary angle-closure disease (PACD) includes:

- Primary angle-closure suspect (PACS): >180 degrees iridotrabecular contact (ITC), normal intraocular pressure (IOP), and no optic nerve damage
- Primary angle-closure (PAC): >180 degrees ITC with peripheral anterior synechiae (PAS) or elevated IOP but no optic neuropathy
- Primary angle-closure glaucoma (PACG): >180 degrees ITC with PAS, elevated IOP, and optic neuropathy

Laser Peripheral Iridotomy (LPI) is one of the treatment modality to treat PACD. It is done by NdYag Laser mostly; sometimes initial thinning of iris is done by argon Laser. A hole is made at the peripheral part of the iris preferably at the crypts for the free circulation of aqueous humor

from posterior to anterior chamber when pupil is blocked by central part of the crystalline lens. It prevents the bowing of peripheral iris over the trabecular meshwork and anatomical appositional angle closer, so that aqueous humor can be freely passed through the conventional trabecular pathway. Early PACG has been proven to respond well to laser iridotomy as a main treatment, however advanced cases may require topical medicine or filtration surgery[1]. Iridotomy works by removing relative pupil block, which is one of the mechanisms that leads to angle closure. Angle closure in Asians may potentially be influenced by non-pupil block processes[2]. It's unclear how important these elements are in different Asian communities, and how much advantage iridotomy provides as a result.

Objective of the study

The main goal of this study is to do prophylactic peripheral Iridotomy (PI) to patients having PACD to prevent the sudden IOP rise by pupil block.

Methodology

Laser peripheral iridotomy is the procedure used to preventively treat primary angle-closure suspects, or patients with narrow angles that are at risk for an angle-closure attack. Although not all patients with narrow angles go on to develop angle-closure glaucoma, laser iridotomy is often performed as a preventive measure because it is relatively low risk compared to potential serious consequences of angle-closure glaucoma.

Type of study: Prospective observational study

Place of study: Bangladesh Eye Hospital Ltd, Shantinagar Ltd, Dhaka, Bangladesh.

Duration of study: 4 years (March, 2018- March, 2022)

Sample size: Total sample was 100 patients.

Sampling method: Purposive sampling technique was applied for this study.

Inclusion criteria

- Both sexes
- Patients with primary angle closer disease (PACG/PAC/PACS)

Exclusion criteria

- Patients not having primary angle closer disease (PACG/PAC/PACS)
- Patients not willing to participate in the study
- Patients having PAS more than 180°on Gonioscopy.

Operative procedures

Before doing Yag Laser Iridotomy, patients was categorized as PACG/PAC/PACS by doing complete ophthalmological examination of anterior and posterior segment by slit lamp biomicroscope with aplanation tonometer, 78 D volk lens and 4 mirror gonioscope. The Nd:YAG laser is preferred because it perforates the iris easily.

1. At first pilocarpin (2%) eye drop was installed several times to miosis of pupil and thinning of iris.
2. Surface anesthesia was installed to the eyes
3. Laser power was set to 2-6 mj, depending on thickness of iris and availability of crypts.
4. Abraham lens with coupling gel was set to eye.
5. Focus the beam at the periphery, preferably on the crypts. Focus in the stroma of iris rather than on the surface, avoiding the visible iris vessels.
6. Most of the cases <5 mj power per pulse is required.
7. 2-4 laser pulse is usually enough to make a full thickness iridotomy hole.
8. After laser, dexamethasone/prednisolone and Brimonidine+Timolol eye drops were advised to prevent the post laser inflammation and IOP hike.

Instruments

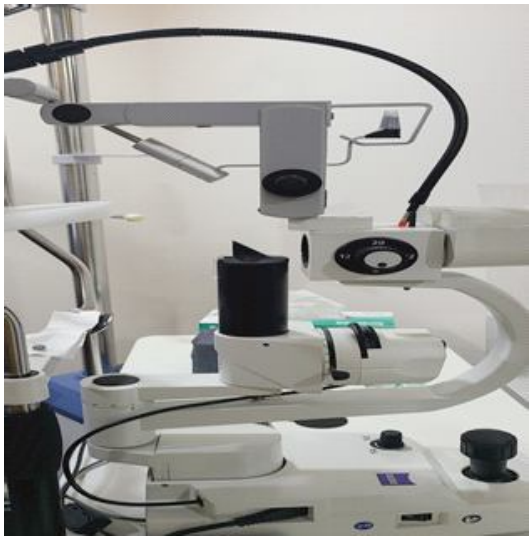


Figure 1: Slit Lamp Biomicroscope with applanation Tonometer by carl Zeiss, Germany

Figure 2: Yag Laser by carl Zeiss, Germany

Figure 3: Volk 4-Mirror Glass Gonio Lens with Handle

Results

In our study, maximum patients (40%) were from 51 to 60 years. And minimum number (5%) of patients was more than 70 years and 40 or less than 40 years. See the table 1 below-

Table-1: Distribution of patients according to age (n=100)

Age (years)	Number of patients	Percentage (%)
40	3	5%
41-50	16	26%
51-60	24	40%
61-70	14	23%
>70	3	5%

In our study, 42 (70%) patients were female and 18 (30%) were male. See table 2 below-

Table 2: Gender distribution of the patients (n=100)

Sex	Number of patients	Percentage (%)
Male	18	30%
Female	42	70%

The table 3 shows that patients was categorized as PACG/PAC/PACS by doing complete ophthalmological examination. Maximum patients (63%) had PACG followed by 17% patients had PAC and 20% patients had PACS. See the table 3 here-

Table-3: Initial diagnosis in eyes treated with Nd: yag laser peripheral iridotomy (n=100)

Diagnosis	Number of patients	Percentage (%)
PACG	38	63%
PAC	10	17%
PACS	12	20%
Total	60	100%

PACG = primary angle closure with glaucomatous optic neuropathy.

PAC = primary angle closure.

PACS = primary angle closure suspect.

Table 4 shows that maximum patients (46) had 11-15 mmHg IOP at presentation followed by (7) had 10 or less than 10 mmHg, (25) had 16-21 mmHg and (22) had more than 21 mmHg. See the table 4 below-

Table 4: The intraocular pressure (IOP) at presentation (mmHg)(n=100)

IOP (mmHg)	Number of fellow eyes
<10	7
11-15	46
16-21	25
>21	22

Table 5 shows the procedure and complications in treated eyes of patients. Here, 20% patients had bleeding from laser site during procedure, which effectively stopped by pressing the cornea with Abraham lens over the eyes and 1 patient had corneal burn. See the table 6 below:

Table 5: Procedure, and Complications in treated eyes of patients (n=100)

Characteristics	No. of patients (%)	P- value
No. of eyes requiring repeated laser treatment, n (%)	08(13%)	0.367
Complications, n (%)		
Bleeding from laser site	12 (20%)	0.052
Corneal burn	01 (1.66%)	

Discussion

The stage of disease upon diagnosis was linked to the outcome of the cases in this study. In such a situation, the real time from disease onset to visual function loss or blindness may be similar to that of a case discovered at a later stage[3]. To address the potential influence of this bias, more follow-up or a randomized controlled trial would be required. In these dark Asian irides, long-term patency rates following YAG laser iridotomy were very good, similar to other investigations in white and Afro-Caribbean eyes[4]. Closure, or reduced iridotomy effectiveness, seems to be linked to a previously described "small" starting hole. Our findings demonstrate that the majority of patients (46) had an IOP of 11-15 mmHg at presentation, with (7) having an IOP of 10 or less than 10 mmHg, (25) having 16-21 mmHg, and (22) having more than 21 mmHg. Other research has found that IOP normalization rates range from 9% without medication to 51% with medication to 90% in a combination of cases with and without maintenance medication[4].

Females outnumber males in the current study. Although females may be over represented in this trial's sample, as is frequent in previous research, the current sample may largely reflect the gender distribution of patients with or at risk of PACG[5]. Glaucoma prevalence studies among Eskimos revealed that females experienced angle-closure glaucoma nearly four times as frequently as males[5]. In eyes with glaucomatous visual field loss, iridectomy or iridotomy is less successful, and additional surgical or pharmacological treatment is frequently necessary to manage IOP[6]. Early diagnosis of eyes at risk of angle closure is believed to improve the chances of a successful iridotomy. Some eyes with patent iridectomies have been observed to experience IOP increases when subjected to dark prone provocation testing[7]. Because an iridotomy removes pupil block, ciliolenticular block or peripheral iris crowding are thought to be a factor in these pressure increases. Regardless, pupil block appears to be the primary mechanism in the establishment of angle closure. In some cases of PACG and PAC, this is evidenced by a decrease in IOP, a widening of the angle, and PAS regression.

Over a six-year follow-up period, Sihota et al. observed that appropriate IOP control was obtained in 65 percent of PACG patients of Indian descent, whereas 35 percent required surgery[8]. The requirement for surgery appears to differ across research. By definition, PAC eyes have no visible optic nerve head or field change. LPI should be curative and prevent illness progression if the disease's underlying etiopathogenic mechanism is merely pupillary obstruction.

In poorer countries, angle closure is a significant issue[9]. According to the Andhra Pradesh Eye Disease Study 3, 2.21 percent of people over 40 had occludable angles at risk of closure and 1.08 percent had manifest PACG, with a considerable number of people going undiagnosed and untreated. The prevalence of 12 apparent PACG was as high as 4.3 percent in the Vellore Eye Study. Angle closure glaucoma accounted for 46% of all primary adult glaucoma cases seen in a North Indian tertiary care hospital [10]. Laser iridotomy removes pupillary obstruction, allowing the convex iris to flatten and the anterior chamber angle to be deepened. Laser iridotomy is often recommended for eyes with occludableirido corneal angles[9]. Because visual loss caused by PACG can be prevented if peripheral iridotomy is performed early, methods for early diagnosis of PAC could lower the incidence of PACG-related blindness in India. In our study, 86 patients' condition was stable, while 14 patients' disease advanced. After treatment, 20% of patients experienced bleeding, and one patient experienced corneal burns. This is much less than the natural history of advancement documented in the PACS 9 and PAC retrospective analysis[11].

Conclusion

Primary angle closure in eyes can be treated safely and effectively with ND Yag laser peripheral iridotomy. It also stops rising IOP having the procedure over time. It widens the angle in all phases of PACD and lowers IOP in eyes that don't have substantial angle or disc damage. In the case of patients with PACD, close monitoring is still recommended. More research is needed to see if treatment outcomes following LPI differ among different racial groups.

References

1. Salmon JF. Long-term intraocular pressure control after Nd-YAG laser iridotomy in chronic angle-closure glaucoma. J Glaucoma 1993;2:291–6.
2. Sakuma T, Sawada A, Yamamoto T, et al. Appositional angle closure in eyes with narrow angles: an ultrasound biomicroscopic study. J Glaucoma 1997;6:165–9
3. Wormald R. Screening in ophthalmology. In: Johnson GJ, Minassian DC, Weale R, eds. The epidemiology of eye disease. London: Chapman and Hall, 1998:83–100.
4. Canning CR, Capon MRC, Sherrard ES, et al. Neodymium: YAG laser iridotomies—short-term comparison with capsulotomies and long-term follow-up. Graefes Arch ClinExpOphthalmol1988;226:49–54
5. Rosman M, Aung T, Ang LPK et al. Chronic angle closure with glaucomatous damage: Long term clinical course in a North American population and comparison with an Asian population. Ophthalmology 2002;109:2227–2231
6. He M, Friedman DS, Ge J et al. Laser peripheral iridotomy in primary angle-closure suspects: Biometric and gonioscopic outcomes: The Liwan Eye Study. Ophthalmology. 2007;114:494–500
7. Fleck BW, Wright E, Fairly EA. A randomized prospective comparison of operative peripheral iridectomy and Nd:YAGlaser iridotomy treatment of acute angle closure glaucoma: 3 year visual acuity and IOP control outcome. Br J Ophthalmol. 1997;81:884–88.
8. Sihota R, Sood A, Gupta V et al. A prospective long term study of primary chronic angle closure glaucoma. Acta OphthalmolScand 2004; 82:209–213.
9. Jacob A, Thomas R, Koshi SP, Braganza A, Muliyil J. Prevalence of primary glaucoma in an urban south Indian population. Indian J Ophthalmol1998;46:81–6
10. Thomas R, Sekhar GC, Kumar RS. Glaucoma management in developing countries: medical, laser, and surgical options for glaucoma management in countries with limited resources. CurrOpinOphthalmol 2004;15:127–31.
11. Thomas R, Parikh R, Muliyil J, Kumar RS. Five-year risk of progression of primary angle closure to primary angle closure glaucoma: a population-based study. Acta Ophthalmol Sc and 2003;81:480–5

Role of OCT in early detection of Primary Open Angle Glaucoma (POAG)

S K Biswas[1], N.C.Barai[2], M Akhtaruzzaman[3], P S Barai[4]

Abstract

Purpose : To evaluate retinal nerve fiber layer (RNFL) and optic nerve head (ONH) changes in primary open angle glaucoma (POAG) by OCT.

Methodology : This prospective observational study was conducted in the department of Glaucoma clinic, National Institute of Ophthalmology & Hospital, Dhaka, Bangladesh during the period of 1st January 2012 to 30th June 2012 on 50 cases of early primary open angle glaucoma ie, glaucoma suspect patient .All patient had a baseline evaluation which included, IOP measurement, angle assessment, anterior & posterior segment assessment including Optic disc ie, Optic Nerve Head (ONH) evaluation. Then assessment of the retinal nerve fiber layer (RNFL) thickness was performed by using a OCT3000 (Humphrey-Zeiss) instrument.

Result : Average RNFL thickness among study subjects out of 50 patients, 09 (18%) patients had average RNFL thickness 60 micrometer(m),17 (34%) had average RNFL thickness between 60-80 micrometer (m), 24(48%) had average RNFL thickness between 80micrometer (μ). Mean average RNFL thickness was 76.30 ± 13.75 micrometer(μ) & quadrant wise RNFL thickness among study subjects, mean inferior quadrant RNFL thickness was 81.30 ± 13.38 μ (SD), mean superior quadrant RNFL thickness was 77.98 ±13.57μ, mean nasal quadrant RNFL thickness was 74.92 ± 13.59μ and mean temporal quadrant RNFL thickness was 71.92± 13.47μ.

Conclusion: OCT in glaucoma is an excellent effective tool in identifying and obtaining more accurate quantitative data related to ONH and RFNL. Analytical result of this study stabilizes that primary open angle glaucoma cases may have moderate to marked RFNL reduction, though these are not evidenced by perimetry. With an earlier accurate diagnosis and timely therapy should be preventing glaucoma related blindness, the goal for this century.

Key words : RNFL, ONH, OCT, POAG.

Authors Information :

[1]Dr. Swapon Kumar Biswas
Medical Vitro-Retina specialist & phaco surgeon Assistant Professor (Ophthalmology)
OSB Eye Hospital & Institute. Dhaka, Bangladesh. E-mail: skbiswas0507@gmail.com

[2]Dr. N.C.Barai
Visiting Professor, TMSS Medical college, Bogra.

[3]Dr. Md.Akhtaruzzaman
Senior Consultant & phaco surgeon, OSB Eye Hospital. Dhaka.

[4]Dr. Partha Sarathi Barai
Assistant surgeon, Netraloy Eyecare, Bogra

Introduction

Glaucoma is a progressive degenerative optic neuropathy. It is one of the main causes of irreversible legal blindness worldwide and more specifically the second cause of loss of vision in patients over 40 years of age in the developed countries[1], with an important impact on quality of life[2-4]. In the first stages, glaucoma-induced structural alterations (apoptosis of ganglion cells, nerve fiber loss, and optic disc alteration) are asymptomatic and cannot be diagnosed clinically until functional changes are detected such as early scotomas in the visual fields (VF). It has been demonstrated that 40%–50% of axonal loss may occur before any change in visual function is detected with perimetry[5]. Early diagnosis of glaucoma, in the first stages, before VF alterations, permits a more accurate treatment with the goal of functional maintenance and preservation of VF with minimum damage[6-7]. There is sufficient evidence that ocular hypertension therapy reduces the relative risk of conversion to glaucoma by 14% with each mmHg intraocular pressure (IOP) reduction[8]. In different studies, it has been found that the optic disc remains a good and simple means for supervising subjects at risk for and in early diagnosis of chronic open-angle glaucoma. The evaluation of changes in the optic disc is greatly aided by systematic recording of observations[9]. OCT represents a new type of imaging modality of quantitative assessment of nerve fiber thickness and optic disc parameters. It is used as a more sensitive method for the detection of early structural glaucomatous nerve alterations that precede optic disc and VF damage[10]. Glaucomatous optic

neuropathy is characterized by progressive thinning of the retinal nerve fiber layer (RNFL). It has been postulated that high-tension primary chronic open angle glaucoma (HT-PCOAG) patients have diffuse functional and morphologic damage to the eye[11-12]. In clinical investigations of high- tension glaucomatous RNFL damage using scanning laser polarimetry[13-14], reduction in RNFL thickness were symmetrical in superior and inferior quadrants. In experimental studies[15]besides the diffuse loss of RNFL, localized RNFL defects were present in high-tension glaucomatous eyes. It has been speculated that in all types of glaucoma, optic nerve fiber loss might occur in a localized pattern that is too small to detect at an early stage and may only become visible later upon coalescence with disease progression. It is generally agreed that standard conventional visual field may not be sensitive enough to detect early glaucomatous damage, and structural changes such as those in the RNFL usually occur earlier than conventional visual field defects[16]. Recently, the ability to quantitatively and objectively evaluate the RNFL has improved considerably and several new instruments have been developed. One of these, optical coherence tomography (OCT; Humphrey Systems Inc., Dublin, CA) is a non-invasive, non-contact method that allows cross-sectional in vivo imaging of intra-retinal layers[17]by measuring the difference of backscattered light at different retinal layers, thus making it possible to assess the RNFL. OCT has been shown to be an objective, reproducible[18-20], and sensitive tool to track RNFL defects in glaucoma[21-25].

Methodology

This prospective observational study was conducted over 50 patients attending in Glaucoma clinic, National Institute of ophthalmology and Hospital, (NIO&H) Dhaka from 1st January 2012 to 30th June 2012, with glaucoma suspects having IOP more than20 mm of Hg in two successive clinical settings. The assessment of retinal nerve fiber layer thickness was performed using a commercial release of the OCT 3000 (Humphrey-Zeiss Instruments). After triggering pupil dilation with 1% tropicamide, 3 circular optical scanning (which scan RNLF thickness) of 3.4 mm diameter was focused on the optic disc. Two analyses was performed on each of the eyes examined: average thickness of retinal nerve fiber layer; thickness of the fiber layer found on the 4 retinal quadrants (upper: 46- 135 degrees, nasal: 136-225 degrees, lower: 226-315 degrees; and temporal: 316-345 degrees).

Results

Results have been shown in tabulated form below:

Table-I : Age distribution of study subjects.

Age range	No. of patients	%
30-40 years	08	16
40-50 years	20	40
50-60 years	22	44
Mean age ± SD: 48.64 ± 7.71 years		

Table-I: shows the distribution of age among the study subjects.08 (16%) patients were among 30 – 40 years age group, 20 (40%) patients among 41-50 years age group and 22 (44%) were among 51-60 years age group. Mean age was 48.64 ± 7.71(SD) years.

Table-2: Sex distribution of study subjects.

Sex	No. of patients	%
Male	22	44
Female	28	56

Table-2: shows the distribution of sex among the study subjects. Among 50 patients, male was 22 (44%) and female was 28 (56 %).

Table-3: Distribution of intraocular pressure among study subjects.

IOP range	No of patients	%
20-25 mm of Hg	27	54
26-31 mm of Hg	16	32
>31 mm of Hg	07	14
Mean IOP ± SD: 16.28 ±3.08 mm of Hg		

Table-3 and Fig.1 shows the distribution of intraocular pressure (IOP) among study subjects. Among 50 patients, 27 (54%) patients had IOP between 20-25mm of Hg, 16 (32%) had IOP between 26-31 mm of Hg and 07 (14%) had IOP over 31 mm oh Hg. Mean IOP was 16.28 ±3.08 mm of Hg.

Table-4 : Distribution of disc features among study subjects.

Disc feature	No of patients	%
Increased cup-disc ratio with NRR thinning	29	58
Disc notching	13	26
Disc haemorrhage	08	16

Table-4 and Fig.2 shows the distribution of disc features of the study subjects. Out of 50 patients, 29 (58%) had increased cup-disc ratio with Neuro-retinal rim (NRR) thinning, 13 (26%) had disc notching and 08 (16%) had disc haemorrhage.

Table-5: Average RNFL thickness.

Average RNFL thickness	No. of patients	%
< 60 micrometer	09	18
60-80 micrometer	17	34
>80 micrometer	24	48
Mean average RNFL thickness ± SD: 76.30 ± 13.75 micrometer ()		

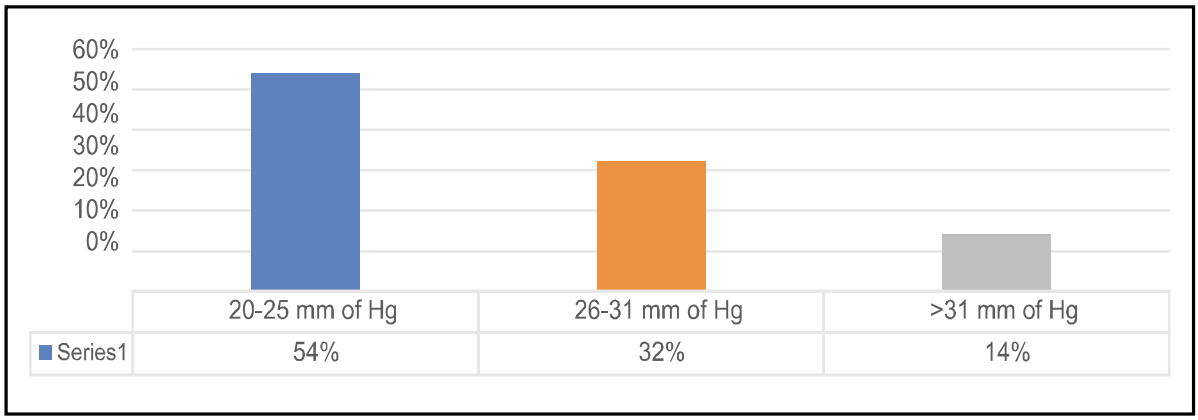


Fig.1: Distribution of intraocular pressure among study subjects.

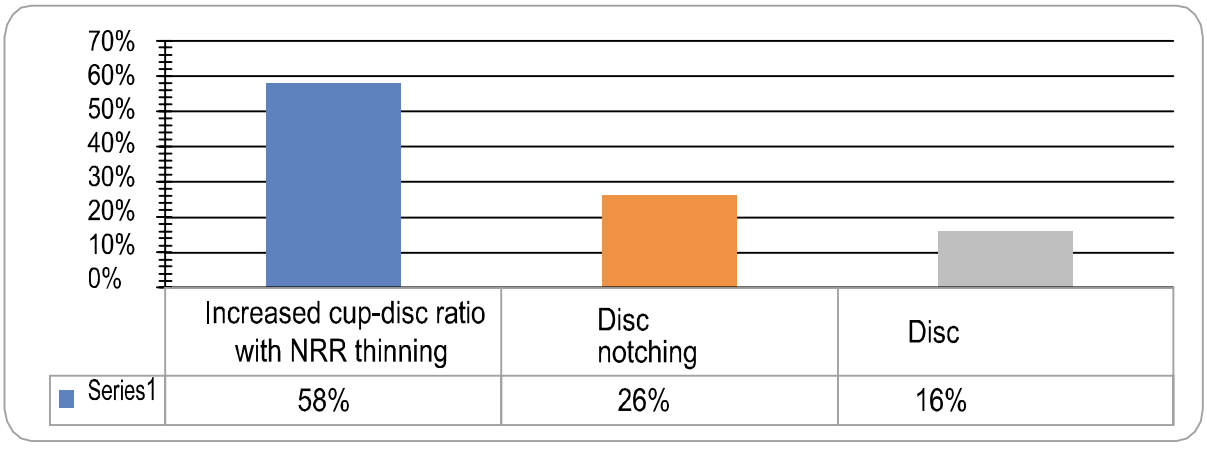


Fig.2: Distribution of disc features among study subjects.

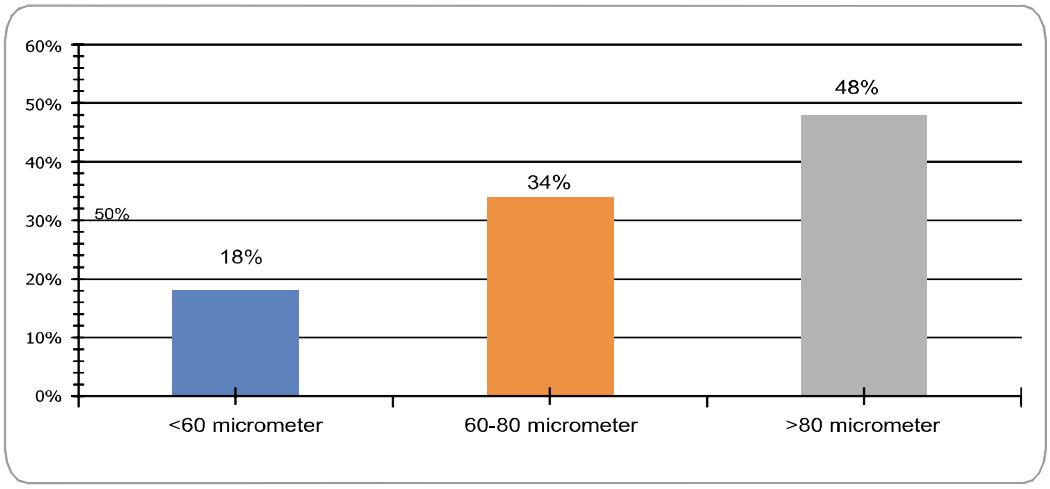


Fig.3 : Average RNFL thickness.

Table-5 and Fig.3 shows the distribution of average RNFL thickness among study subjects. Out of 50 patients, 09(18%) patients had average RNFL thickness < 60 micrometer (ì), 17(34%) had average RNFL thickness between 60-80 micrometer (ì) 24(48%) had average RNFL thickness between >80micrometer (ì). Mean average RNFL thickness was

76.30 ± 13.75 micrometer(ì).

Table-6: Quadrant wise RNFL Thickness.

Mean RNFL thickness	Mean ± SD
Inferior quadrant	81.30 ± 13.38 ¼
Superior quadrant	77.98 ± 13.57 ¼
Nasal quadrant	74.92± 13.59 ¼
Temporal quadrant	

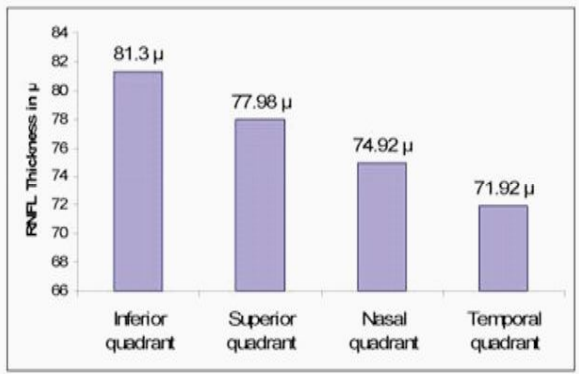


Fig.4: Quadrant wise RNFL Thickness.

Table-6 and Fig.4 shows the distribution of quadrant wise RNFL thickness among study subjects. Out of 50 cases, mean inferior quadrant RNFL thickness was 81.30 ± 13.38 ì (SD), mean superior quadrant RNFL thickness was 77.98 ±13.57 ì, mean nasal quadrant RNFL thickness was 74.92 ± 13.59 ì and mean temporal quadrant RNFL thickness was 71.92± 13.47 ì.

Discussion

This prospective observational study was conducted in Glaucoma clinic National Institute of Ophthalmology & Hospital, Dhaka, Bangladesh during the period of 1st January 2012 to 30th June 2012 on early primary open angle glaucoma patients. Early primary open angle glaucoma cases were defined as IOP above 21 mmHg in three separate measurements, suspicious appearance of the optic disc (OD) ie, one of the following: notching, hemorrhage, and suspicious cup: disc (C/D) ratio & thinning of neuro-retinal rim. A total of 50 cases were included in the study. All patients had a baseline evaluation which included IOP measurement, angle assessment, anterior and posterior segment assessment including disc evaluation. Then, the assessment of retinal nerve fiber layer thickness was performed using OCT3000 (Humphrey-Zeiss Instruments). Average thickness of retinal nerve fiber layer; thickness of the fiber layer found on the 4 retinal quadrants

(upper: 46- 135 degrees, nasal: 136-225 degrees, lower: 226-315 degrees; and temporal: 316-345 degrees). Table-1 shows the distribution of age among the study subjects. 08(16%) patients were among 30 – 40 years age group, 20 (40%) patients among41- 50 years age group and 22 (44%) were among 51-60 years age group . Mean age was 48.64 ± 7.71 (SD) years. Mayoral et al (2006)17 showed the mean age in their study was 58.61± 9.15. Lalezary et al (2006)18 showed mean age 50.43± 21 in their study[17]. Filho et al showed the mean age

44.2 years in their study[30]. Other studies on glaucoma suspects also reflect age ranging from 45-60 years. Age older than 40 years is a risk factor for the development of POAG, with up to 15% of people affected by the seventh decade of life[32]. Table-II shows the distribution of sex among the study subjects. Among 50 patients, male was 22 (44%) and female was 28 (56 %). Reports on sex predilection differ. Although some age-controlled studies have reported significantly higher mean IOP values in women than in men, others have failed to find such a difference, while others have even shown males to have a higher prevalence of glaucoma. Taliantzis et al showed male predominance in their study. Wollstein et al showed 57% female and 43%male in their study. Table-III and Fig.1 shows the distribution of intraocular pressure (IOP) among study subjects. Among 50 patients, 27 (54%) patients had IOP between 10-15mm of Hg, 16 (32%) had IOP between 16-21 mm of Hg and 07 (14%) had IOP over 21 mm of Hg. Mean IOP was 16.28 ±3.08 mm of Hg. Taliantzis et al showed mean IOP 22.16 ± 2.1. Filho et al showed mean IOP 18.75 mm of Hg in their study. Percentage of marked RNFL loss was observed in studies where mean IOP was more than 21 mm of Hg 43. Table- IV and Fig.2 shows the distribution of disc features of the study subjects. Out of 50 patients, 29 (58%) had increased cup-disc ratio with Neuro-retinal rim (NRR) thinning, 13 (26%) had disc notching and 08 (16%) had disc haemorrhage. It has been shown that increased cup-disc ratio with NRR thinning was the commonest features in different studies 44. Table-V and Fig.3 shows the distribution of average RNFL thickness among study subjects. Out of 50 patients, 09 (18%) patients had average RNFL thickness < 60 micrometer (ì), 17 (34%) had average RNFL thickness between60-80 micrometer (ì) 24(48%) had average RNFL thickness between >80 micrometer(ì). Mean average RNFL thickness was 76.30 ±13.75 micrometer (ì). Aydin et al showed mean RNFL thickness 72.8 ± 20.5 ì in their study. Wollstein et al showed mean RNFL thickness 93.97 ì in glaucoma suspects cases. Bendschneider et al (2010) showed mean RNFL thickness 97.2±9.7ìm. Wollstein et al(2011) showed mean RNFL thickness was 75.3ìm. Table - VI and Fig.4 shows the distribution of quadrant wise RNFL thickness among study subjects. Out of 50 cases, mean inferior quadrant RNFL thickness was 81.30 ± 13.38 μ (SD), mean superior quadrant RNFL thickness was 77.98 ±13.57 μ, mean nasal quadrant RNFL thickness was 74.92 ±

13.59 μ and mean temporal quadrant RNFL thickness was 71.92± 13.47 μ. Wollstein et al(2011) showed that mean Superior RNFL thickness 83μm, inferior 87μm,nasal 70μm and temporal 51μm. Aydin et al showed that mean Superior RNFL thickness 87.9μm, inferior 85.9μm, nasal 55.3μm and temporal 61μm. In this study glaucomatous patients were also included. Filho et al showed that mean Superior RNFL thickness 105μm, inferior 97ìm, nasal 48μm and temporal 41μm. In glaucomatous case altered thickness pattern has been observed. Out of 50 patients, 09 (18%) were diagnosed as having glaucoma on the basis RNFL thickness reduction(RNFL thickness & lt; 60 μ). (Wollstein et al (2011) observed 17.3% cases in their case series having marked RNFL loss and detected as having glaucoma. OCT is not the only tool for early diagnosing of glaucoma; there are other tools too. Automated perimetry is the important tool for functional assessment of RNFL loss. But it becomes effective after marked RNFL damage. This study was conducted to see the RNFL thickness status in glaucoma suspect cases (early POAG) where perimetric appearance was still not in favour of glaucoma.

Conclusion

OCT is a useful instrument that allows early detection of RNFL as well as optic nerve head defects, and facilitates their follow-up over time. This study was conducted to detect changes that occurs in RNFL and ONH in patients with early POAG by OCT and thereby assessment of their visual prognosis. The aim of the study was to compare and review the finding of other study, done by other authors.

References

1. Kobelt G, Jonsson B, Bergström A, Chen E, Lindén C, Alm A Cost- effectiveness analysis in glaucoma: what drives utility? Results from a pilot study in Sweden. Acta Ophthalmol Scand.2006; 84(3):363–371.
2. Skalicky S, Goldberg I. Depression and quality of life in patients with glaucoma: a cross- sectional analysis using the Geriatric Depression Scale- 15, assessment of function related to vision, and the Glaucoma Quality of Life-15. J Glaucoma.2008; 17(7):546–551.
3. McKean-Cowdin R, Wang Y, Wu J, Azen SP, Varma R. Impact of visual field loss on health- related quality of life in glaucoma: the Los Angeles Latino Eye Study. Ophthalmology.2008; 115(6):941–948.e1.
4. Goldberg I, Clement CI, Chiang TH, Walt JG, Lee LJ, Graham S,Healey PR. Assessing quality of life in patients with glaucoma using the Glaucoma Quality of Life-15 (GQL-15) questionnaire.J Glaucoma.2009; 18(1):6–12.
5. Quingley HA, Addicks EM, Green RW. Optic nerve damage inhuman glaucoma III; quantitative correlation of nerve fiber lossand visual field defect in glaucoma, ischemic neuropathy,63papilledema and toxic neuropathy. Acta Ophthalmol. 1982;100:135–146.
6. Sharma P, Sample PA, Zangwill LM, Schuman JS. Diagnostic toolsfor glaucoma detection and management. Surv Ophthalmol.2008; 53(Suppl 1):S17–S32.
7. Hazin R, Hendrick AM, Kahook MY. Primary open-angle glaucoma: diagnostic approaches and management. J Natl MedAssoc.2009;101(1):46–50.
8. Peeters A, Webers CA, Prins MH, Zeegers MP, Hendrikse F,Schouten JS. Quantifying the effect of intraocular pressurereduction on the occurrence of glaucoma. Acta Ophthalmol. 2009.Apr 27, [Epub ahead of print]
9. Esmenjaud E. Modifications papillaires précoces et glaucomechronique à angle ouvert. J Fr Ophtalmol. 2004;27(1):24–33.
10. Lalezary M, Medeiros FA, Weinreb RN, et al. Baseline optical coherence tomography predicts the development of glaucomatous change in Glaucoma suspects. Am J Ophthalmol.2006;142(4):576–582.
11. Balwantray CC, Drance SM, Douglas GR, et al. Visual field damage in normal-tension and high-tension glaucoma. Am J64Ophthalmol. 1989; 108:636–642.
12. Eid TE, Spaeth GL, Moster MR, et al. Quantitative differences between the optic nerve head and peripapillary retina in low-tension and high-tension primary open-angle glaucoma. Am J Ophthalmol.1997; 124:805–813.
13. Kuboat T, Khalil AK, Honda M, et al. Comparative study of Retinal nerve layer damage in Japanese patients with normal- and high-tension glaucoma. J Glaucoma. 1999;8:363–366.
14 Kook MS, Sung K, Kim S, et al. Study of retinal nerve fiber layer thickness in eyes with high tension glaucoma and hemifield defect. Br J Ophthalmol. 2001; 85:1167–70.
15. Jonas JB, Hayreh SS. Localized retinal nerve fiber layer defection chronic experimental high pressure glaucoma in rhesusmonkeys.Br J Ophthalmol. 1999; 83:1291–1295.
16. Quigley HA, Dunkelberger GR, Green WR. Retinal ganglion cell atrophy correlated with automated perimetry in human eyes with glaucoma. Am J Ophthalmol. 1989; 107:453–464.
17. Hee MR, Izatt JA, Swanson EA, et al. Optical coherence tomography of the human retina. Arch Ophthalmol. 1995;65113:325–332.
18. Schuman JS, Pedut-Kloizman T, Hertzmark E, et al. Reproducibility of retinal thickness measurements using optical coherence tomography. Ophthalmology. 1995;113:1889–1898.
19. Blumenthal EZ, Williams JM, Weinreb RN, et al. Reproducibility of nerve fiber layer thickness measurements by use of optical coherence tomography. Ophthalmology.2000;107:2278–2282.
20. Jones AL, Sheen NJL, North RV, et al. The Humphrey optical coherence tomography scanner: quantitative analysis and reproducibility study of the normal human retinal nerve fiber layer. Br J Ophthalmol. 2001; 85:673–677.
21. Pieroth L, Schuman JS, Hertzmark E, et al. Evaluation of foca ldefects of the nerve fiber layer using optical coherence tomography. Ophthalmology. 1999; 106:570–579
22. Zangwill LM, Williams J, Berry CC, et al. A comparison of optical coherence tomography and retinal nerve fiber layer photography for detection of nerve fiber layer damage in glaucoma. Ophthalmology. 2000; 107:1309–1315.
23. Hon ST, Greenfield DS, Mistlberger A, et al. Optical coherence tomography and scanning laser polarimetry in normal, ocular hypertensive, and glaucomatous eyes.

Am J Ophthalmol.2000;129:129–135.

24. Bowd C, Weinreb RN, Williams JM, et al. The retinal nerve fiberlayer thickness in ocular hypertensive, normal, and glaucomatous eyes with optical coherence tomography. ArchOphthalmol. 2000; 118:22–26.
25. Lee VW, Mok KH. Nerve fiber layer measurement of the HongKong Chinese population by scanning laser polarimetry. Eye2000;14:371–374.
26. Bowd C, Zangwill LM, Berry CC, Blumenthal EZ, Vasile C,Galeana CS, Bosworth CF, Sample PA, Weinreb RN. DetectingEarly Glaucoma by Assessment of Retinal Nerve Fiber LayerThickness and Visual Function. InvestOphthalmol Vis Sci.2000;41:741–748.
27. Kanamori A, Nakamura M, Escano MF, Seya R, Maeda H, NegiA .Evaluation of the glaucomatous damage on retinal nerve fiberlayer thickness measured by optical coherence tomography. Am JOphthalmol. 2003 Apr;135(4):513-20.
28. Sihota R, Sony P, Gupta V, Dada T, Singh R. Diagnostic Capabilityof Optical Coherence Tomography in Evaluating the Degree of Glaucomatous Retinal Nerve Fiber Damage. Invest Ophthalmol VisSci. 2005;41:741–748.
29. Wollstein G, Schuman JS, Aydin A, Stark PC, Hertzmark E, Lai E,Ishikawa H, Mattox C, Fujimoto JG, Paunescu LA. Optical Coherence Tomography Longitudinal Evaluation of Retinal NerveFiber Layer Thickness in Glaucoma. Arch ophthalmol.2005;123:464-470.
30. Mayoral F, Polo V, Ferreras A, Larrosa JM, Pueyo V, Honrubia F.Diagnostic ability of stratus Optical Coherence Tomography (OCT)in pre-perimetric glaucoma diagnosis. Arch Soc Esp Oftalmol 2006;81: 537-544.
31. Lalezary, M., Medeiros, F.A., Weinreb, R.N. Baseline OpticalCoherence Tomography Predicts the Development of Glaucomatous Change in Glaucoma Suspects | Am J Ophthalmol | vol. 142,576 - 582, 200632. Chiseliþã D,Danielescu C, Apostol A. Correlation between structural and functional analysis in glaucoma suspects. Oftalmologia. 2008;52(1):111-8.
33. Medeiros FA, Vizzeri G, Zangwill, LM, Alencar LM, Sample PA, Weinreb RN. Comparison of Retinal Nerve Fiber Layer and Optic Disc Imaging for Diagnosing Glaucoma in Patients Suspected of having the Disease. Ophthalmology. 2008 August; 115(8):1340–1346.
34. Taliantzis S, Papaconstantinou D, Koutsandrea C, Moschos M,Apostolopoulos M, Georgopoulos G. Comparative studies of RNFL thickness measured by OCT with global index of visual fields in patients with ocular hypertension and early open angle glaucoma. Dovepress J Ophthalmol; June 2009 Volume 2009:3 Pages373 – 379.35.Rader J, Feuer WJ, Anderson DR. Peripapillary vasoconstriction inThe 36. Kobelt G, Jonsson B, Bergström A, Chen E, Lindén C, Alm A.Costeffectiveness analysis in glaucoma: what drives utility? Results from apilot study in Sweden. Acta Ophthalmol Scand. 2006;84(3):363-371.

What has the ZAP study taught us about doing peripheral laser iridotomy in patients suspected of having primary angle closure?

S F F Aziz[1], I M Munir[2]

Introduction and Background

Glaucoma is the leading cause of irreversible blindness. We know that 20 million people globally suffer from primary angle-closure glaucoma. Primary angle closure suspects have a greater risk of glaucoma. The goal of ZAP study was to see whether laser peripheral iridotomy prophylaxis was effective or not in Chinese patients with primary angle closure.

The morbidity due to disease is also quite high, with an estimated 3.5% of population aged 40–80 years suffering from glaucoma (1,2). PACG is responsible for 31% of all cases globally, but the proportion has been reported to be higher in Asia at 40% (2).The disease causes greater proportion of blindness than that of POAG (3), according to data from population-based studies in Asia.

Methodology

Bilateral primary angle closure suspects aged 50–70 years were included in this six-year randomized controlled study at the Zhongshan Ophthalmic Center, a tertiary specialized hospital in Guangzhou, China.

Patients had laser peripheral iridotomy in one eye at a time, while the other was left untreated. The primary outcome was incident primary angle closure as a composite endpoint of elevation of intraocular pressure, peripheral anterior synechiae, or acute angle-closure during 72 months of follow-up in an intention-to-treat analysis between treated eyes and contralateral controls.

"In the untreated eyes, PAS was by far the most common," said Dr.Friedman, a ZAP coauthor. "But PAS is a slow, benign process that doesn't result in visual loss or affect the patient's life if pressure remain normal."

Discussion

Prophylactic laser peripheral iridotomies (LPI) are routinely offered to persons who have PACS and those with PAC (4,5). LPI causes widening of the anterior chamber angle and a deepening of the anterior chamber in eyes with PAC, while these parameters do not change significantly to PACG (6).

LPI increases angle width and has good safety profile with most PACS eyes not receiving further interventions (7) report by American Academy of Ophthalmology. In Scotland, rates of prophylactic LPIs have increased by 317% in the last few years. Study found 16.4% of patients with PACS had progression. There are limited data on the efficacy of LPI in eyes with PACS and this remains a controversial issue. The new study was published in the March 2019 issue of the Lancet, by Dr. David Gertrude-Meyer. He and his colleagues found no evidence to suggest that LPI is effective. The Zhongshan Angle Closure Prevention (ZAP) trial in urban Guangzhou, China, was a success. The researchers found that LPI reduced the risk of PAC in patients with bilateral PACS aged 50-70 years old.

Patients were screened by trained ophthalmologists using standardized procedures. Static gonioscopy was done, with allowance of slight tilt of gonioprism for evaluation of angle. If trabecular meshwork was not visible on static gonioscopy, dynamic evaluation with four mirror gonioscope was done to check for presence of peripheral anterior synechiae (PAS). PACS only if PAS were absent and trabecular meshwork was not visible in 6 clock hours under non-indentation of gonioscopy, along with absence of PAC or PACG, in both eyes.

After that, the optic disc was examined. If the vertical cup disc ratio was less than 0.7, asymmetry

Authors Information :

[1]Dr. Syeda Fahmida Farzana Aziz, Fellow, Glaucoma department, NIO&H

[2]Dr. Iftekhar Md. Munir, Professor, Department of Glaucoma, National Institute of Ophthalmology and Hospital

was less than 0.2, and the neuroretinal rim width was higher than 0.1 vertical disc diameter, the eyes were suitable for LPI. One randomly selected eye underwent LPI while the contralateral eye served as the control. Two-week, six-month, 18-month, and 36-month follow-ups were planned, with 54 and 72-month follow-ups added subsequently.

The sample size was calculated as 700 in each arm; 889 eyes received LPI and an equal number of fellow eyes were controls. There was 22% attrition at 72 months, with a majority 15% happening after 36 months. The primary outcome was the incidence of PAC at 72 months based on one of three events (I) raised IOP (>24 mm on two occasions); (II) PAS 1 clock hour; or (III) an AAC episode.

Ten out of 889 patients were treated with LPI. No association was observed with higher IOP, Shaffer angles, lens thickness, provocative tests, or gender. Study found 47% reduction in rate of LPI compared to no surgery.

Visual acuity, intraocular pressure, gonioscopy, total angle width, anterior chamber depth, and any adverse events during laser peripheral iridotomy or follow-up visits were the secondary endpoints. When comparing LPI eyes to control eyes, the overall mean total Shaffer angle grades was greater in LPI eyes.

However, 49% angles remained closed 2 weeks after the LPI procedure. No adverse events were observed post-LPI and similar corneal endothelium density and LOCS scores were observed in both groups at 72 months follow-up. None of the patients had vision loss after five follow-ups, but 10% reported glare after LPI.

Strengths and limitations

Enrollment, exclusion, and assessment criteria were all well specified in the experiment. The sample size was determined to be adequate.

Advertisements were used to choose the sample from the community. The intervention was assigned at random and masked. Because of the low incident rates, the research had a long follow-up period, which was extended.

Adequate data safety mechanisms including an independent biostatistics center. The trial followed the recommended guidelines to minimize bias. The low progression rates may be specific to the populations under study and may not be generalizable to other populations. The authors were unable to come to any definitive findings on risk factors for advancement from PACS to PAC, or for selecting high-risk individuals who would benefit the most from LPI. Other significant elements that have not been explored include the effect of corneal thickness on IOP measurements, diurnal IOP fluctuation, and family history of PAC glaucoma.

Conclusions

In a well-designed trial, He et al. present thorough data on the efficacy of LPI in the prevention of PAC in patients with PACS. Patient should be educated about the symptoms/signs of an acute attack of angle closure in the PACS eye which have not undergone laser and may be advised to instill 2% pilocarpine eye drops in such a situation, if immediate access to health care services is not available.

References

1. Quigley HA, Broman AT. The number of people with glaucoma worldwide in 2010 and 2020. Br J Ophthalmol 2006;90:262-7.
2. Tham YC, Li X, Wong TY, et al. Global prevalence of glaucoma and projections of glaucoma burden through 2040: a systematic review and meta-analysis. Ophthalmology 2014;121:2081-90.
3. Foster P, Quigley H. Glaucoma. In: Johnson GJ, Minassian DC, Weale RA, et al. editors. The Epidemiology of Eye Disease. 3rd ed. London, UK: Imperial College Press; 2012:241-66.
4. Robin AL, Pollack IP. Argon laser peripheral iridotomies in the treatment of primary angle closure glaucoma. Longterm follow-up. Arch Ophthalmol 1982;100:919-23.
5. Weinreb RN, Aung T, Medeiros FA. The pathophysiology and treatment of glaucoma: a review. JAMA 2014;311:1901-11.
6. Dada T, Mohan S, Sihota R, et al. Comparison of ultrasound biomicroscopic parameters after laser iridotomy in eyes with primary angle closure and primary angle closure glaucoma. Eye (Lond) 2007;21:956-61.
7. Radhakrishnan S, Chen PP, Junk AK, et al. Laser Peripheral Iridotomy in Primary Angle Closure: A Report by the American Academy of Ophthalmology. Ophthalmology 2018;125:1110-20.

Phacomatosis pigmentovascularis - a case series

S M Noman[1], U S Akbar[2], M Haque[3], M Islam[4], D Sarkar[5], S Kaoser[6]

Abstract

Purpose : To observe and describe a rare disease, Phacomatosis pigmentovascularis as case series.

Method : Detailed history taking and examination was done in the glaucoma clinic of Chittagong Eye Infirmary and Training Complex (CEITC) for the diagnosis of those suspected cases. Detailed systemic examinations of skin, cardiac and nervous system were done. Ocular examinations included visual acuity, intraocular pressure, gonioscopy (while possible), torch light and slit lamp examination and fundus evaluation were done.

Result : Total of 8 cases were included (Five male and three female). Average age group was 4 +/-2 years. All of them had haemangiomatous lesion in the hand and feet. Five of them had haemangioma in the both side of the face. Five cases had bilateral and rest two had unilateral naevus of ota in the eye. Three cases had bilateral and rest five cases had unilateral mild buphthalmos and raised intraocular pressure (IOP). There was history of convulsion in two cases and CT brain revealed calcification in the brain. All cases needed trabeculectomy surgery to reduce IOP. Two cases needed Ahmed valve implant.

Conclusion : Phacomatosis pigmentovascularis is a rare entity. Early diagnosis and appropriate measurement can save their vision as well as life.

Key words : Haemangioma. Phacomatosis. Buphthalmos. Galucoma. Trabeculectomy

Introduction

Phacomatosis pigmentovascularis (PPV) is a disorder characterized by the co-existence of vascular and pigmentary birthmarks.[1] Signs and symptoms may include port wine stain, melanocytic nevi (commonly known as moles), epidermal nevi, dermal melanocytosis (areas of blue-gray discoloration), nevus spilus and patches of hyperpigmentation (areas of darker skin). Other skin features may include nevus anemicus (areas of lighter skin) and café au lait spots.[2] About half of people with PPV have systemic involvement, which means they have features affecting other areas of the body. People with systemic involvement may have neurologic, ocular (eye), or muscular abnormalities.[2][3] Several subtypes of PPV have been identified which are generally distinguished based on the specific type(s) of skin features present.[1][2]

Authors Information :
[1]Dr. Shams Mohammed Noman
Associate Professor of Ophthalmology, BSMMU
drshams_noman@yahoo.com
[2]Dr. Umme Salma Akbar
Associate Consultant, Glaucoma, CEITC
[3]Dr. Mehjabin Haque
Assistant Professor of Ophthalmology, BSMMU
[4]Dr. Muzahidul Islam
Resident, Dept. of Ophthalmology, BSMMU
[5]Dr. Dipankar Sarkar
[6]Dr. Shabiha Kaoser
[4, 5, 6] Resident, Dept. of Ophthalmology, BSMMU

Method

This was an observational case series study done for the last 7 years at the glaucoma clinic of CEITC. Patient who presented in the paediatric outdoor with vascular malformation in the face were referred to the glaucoma clinic for detail evaluation. In glaucoma clinic, history taking like ocular pain, photophobia, headache, convulsion were taken and some examinations like vision, refraction, pupillary reaction, IOP measurement digitally or by applanation tonometry, torchlight and or slit lamp examination and fundoscopy were done. Patients who had vascular malformation in and around the face were checked for oculocutaneous naevus, conjunctival vascular malformation and megalocornea. We did fundoscopy to exclude any glaucomatous change in the disc or haemangioma in the retina and choroid. Fundus photography was done wherever possible. CT scan of the brain was done when there was a history of convulsion and affordable by the patient. Raised intraocular pressure was managed by trabeculectomy

surgery. Tube implantation was done in the failed cases.

Result

Among the 8 cases, five of them were male and three female. Average age group was 4 +/-2 years. Older one was 6 years and younger was 2 years of age. All of them had haemangiomatous lesion in the hand and feet. But the oldest one had massive haemangioma in the trunk and was associated with pachy naevus all over the body. Five of them had haemangioma on both sides of the face. Three of them had upper lid swelling in the affected side. Five cases had bilateral and two had unilateral naevus of ota in the eye those were distributed following a dermatome of frontal and maxillary division of trigeminal nerve. Three cases had bilateral and rest five cases had unilateral mild buphthalmos and raised IOP. Average IOP was 25 +/- 5 mmHg where it was possible to be measured. IOP was more where haemangiomatous lesion was more prominent. In two cases there was history of convulsion and CT brain revealed calcification in the brain.

All of them were treated with brinzolamide and timolol combination two times daily for reduction of IOP but was not possible to be reduced. Fundus examination revealed C:D of average 0.8:1 except two cases where it was almost full cupping. All cases needed trabeculectomy surgery to reduce IOP. Two cases needed Ahmed valve implant. In two cases, IOP was not controlled and Ahmed valve implantation has been planned.

Fig-1.2 Haemangiomatous changes on both sides of the face with buphthalmos in the right side

Fig-3.4 Haemangiomatous lesion in the chest and trunk

Discussion

Isolated PPV is typically a sporadic disorder that occurs for the first time in people with no family history of PPV.[4] Researchers have found that PPV can be caused by a somatic mutation in the GNA11 or GNAQ gene that is present only in the affected tissues of the body. These mutations are not present in the blood or in unaffected tissues, which means the disorder is likely due to non-inherited mutations that are randomly acquired after conception. In some cases of isolated PPV, the underlying cause remains unknown.[1]

There is no family history of such disease in our cases and we did not do any genetic analysis.

Treatment and long-term outlook (prognosis) of PPV largely depends whether there is systemic involvement and which body parts or organ systems are affected.[3,4] Isolated PPV without systemic involvement typically does not require treatment. However, large skin lesions may cause problems with body image and self-esteem, so laser treatments may be considered to improve the appearance of skin. In our cases we referred the patient to the skin specialist and they were under observation.

Characteristic signs and symptoms of phacomatosis pigmentovascularis (PPV) involving the skin include port wine stain and various pigmentary lesions (lesions that are brown, black or blue in color). The port wine stain and pigmentary lesions may be extensive, affecting several areas of the body, including the face. Examples of associated pigmentary lesions include:[2,3]

- Melanocytic nevi
- Epidermal nevi
- Nevus anemicus (areas of lighter skin)
- Hyperpigmentation (areas of darker skin)
- Cafe-au-lait spots
- Dermal melanocytosis (areas of blue-gray discoloration)
- Nevus of Ota

In our series they presented with vascular malformation in the face and trunk and also in the limb as well as with naevus over face and in the eye (conjunctiva). Around half of people with PPV have systemic involvement (i.e., body systems other than the skin are affected). Eye conditions such as ocular melanosis (also called ocular melanocytosis) are common. Ocular melanosis refers to a blue-gray pigmentation in the white of the eye (the sclerae). This condition often occurs along with nevus of Ota and may affect one or both eyes[5]. In our series five cases had bilateral and two cases had unilateral naevus in the face and eye. Naevus follows the dermatome of T1 and T2.

Eye naevus is subconjunctival melanocytosis in nature. Complications of nevus of Ota include glaucoma and melanoma, so people with nevus of Ota require careful examination and follow-up by an ophthalmologist.[7] Other eye conditions reported in PPV include iris hamartomas, iris mammillations and iris nodules.[7] When neurologic abnormalities are present they usually become apparent in the first few months of life and may include developmental delay, seizures, intracranial calcifications (calcium deposits within the brain) or cerebral atrophy.[3] Some people with PPV also have Sturge-Weber syndrome or Klippel-Trenaunay syndrome, each of which causes various signs and symptoms.[8] Two of our cases had cerebral calcification in the CT scan. In almost all of our cases there was secondary glaucoma. The pathogenesis is combined. Developmental anomaly, raised episcleral venous pressure and melanocyte accumulation in the angle were the mechanism. We did gonioscopy in two cases where we found angle anomaly and hyperpigmentation of the angle.

A variety of other signs or symptoms have been reported in individual cases of PPV (e.g. primary lymphedema, renal angiomas, moyamoya disease, scoliosis, malignant colonic polyposis, hypoplastic larynx, multiple granular cell tumors, and selective IgA deficiency).[9] In our series, we did not get such association so far.

If phacomatosis pigmentovascularis (PPV) is not associated with systemic complications (e.g., Sturge-Weber syndrome, Klippel-Trenaunay syndrome, neurological problems or eye conditions) it typically does not require treatment. However, because large skin lesions may cause problems with body image and self-esteem, parents of children with PPV, or adults with PPV, may consider laser treatments to improve the appearance of skin lesions.[5,6]

Glaucoma in such cases is usually refractory to

medicine and also standard trabeculectomy. So trabeculectomy with antimetabolites is comparatively better option. But there is no published report over it. But in the Sturge Weber syndrome trabeculectomy with mitomycin-C yields good result. In our series four cases were doing well with trabeculectomy with mitomycin-C but in other cases IOP was raised again and we did Ahmed valve implantation in two cases and two cases we have planned to do so. We are now following those cases for final outcome of the surgery.

Conclusion

Phacomatosis pigmentovascularis is a rare entity. Combined management from dermatologist, neurologist and ophthalmologist are needed to handle those multisystem complex cases. Uncontrolled intraocular pressure may cause blindness. Early diagnosis and appropriate medical and surgical management is mandatory to save the eye from blindness.

References

1. Thomas AC, Zeng Z, Rivière JB, et al. Mosaic Activating Mutations in GNA11 and GNAQ Are Associated with PhakomatosisPigmentovascularis and Extensive Dermal Melanocytosis. J Invest Dermatol. April, 2016; 136(4):770-778. https://www.ncbi.nlm.nih.gov/pubmed/26778290.
2. Galbraith S. Capillary malformations (port wine stains) and associated syndromes. UpToDate. Waltham, MA: UpToDate; November, 2016; https://www.uptodate.com/contents/capillary-malformations-port-wine-stains-and-associated-syndromes.
3. Diaz LZ. Vascular lesions in the newborn. UpToDate. Waltham, MA: UpToDate; April, 2018; https://www.uptodate.com/contents/vascular-lesions-in-the-newborn.
4. Nanda A, Al-Abdulrazzaq HK, Habeeb YK, Zakkiriah M, Alghadhfan F, Al-Noun R, Al-Ajmi H. Phacomatosis pigmentovascularis: Report of four new cases..Send to Indian J Dermatol VenereolLeprol. May-June, 2016; 82(3):298-303. https://www.ncbi.nlm.nih.gov/pubmed/27088932.
5. Fernández-Guarino M, Boixeda P, de Las Heras E, Aboin S, García-Millán C, Olasolo PJ. Phakomatosis pigmentovascularis: Clinical findings in 15 patients and review of the literature. J Am AcadDermatol.. 2008 Jan; Epub 2007 Nov 28;
6. Kono T, Erçöçen AR, Chan HH, Kikuchi Y, Hori K, Uezono S, Nozaki M. Treatment of phacomatosis pigmentovascularis: a combined multiple laser approach. Dermatol Surg. June, 2003; 29(6):642-646. https://www.ncbi.nlm.nih.gov/pubmed/12786710.
7. Chekroun-Le Du L et al.,. Phacomatosis pigmentovascularis type II. European Journal of Dermatology. 1998; http://www.john-libbey-eurotext.fr/en/print/e-docs/00/01/87/6B/article.phtml. Accessed 2/1/2011.
8. Sen S, Bala S, Halder C, Ahar R, Gangopadhyay A. Phakomatosispigmentovascularis presenting with sturge-weber syndrome and klippel-trenaunay syndrome. Indian J Dermatol. January-February, 2015; 60(1):77-79. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4318068/.
9. Narchi H et al.,. Picture of the month. Arch PediatrAdolesc Med. 2001; http://archpedi.ama-assn.org/cgi/content/full/155/2/191. Accessed 2/1/2011.

The **WGA invites you** to actively contribute to the congress by **submitting an abstract** for consideration and inclusion in the program of the **10th World Glaucoma Congress.**

Abstract Submissions will open on **Monday, August 29, 2022.**

ARISTOVISION

Excellence in eye care

The **LEADER** in Bangladesh ophthalmic market **over the last 16 years**

Proudly providing local products ... with international quality

Export to 5 continents

Power to calm down IOP storm

Nesudil

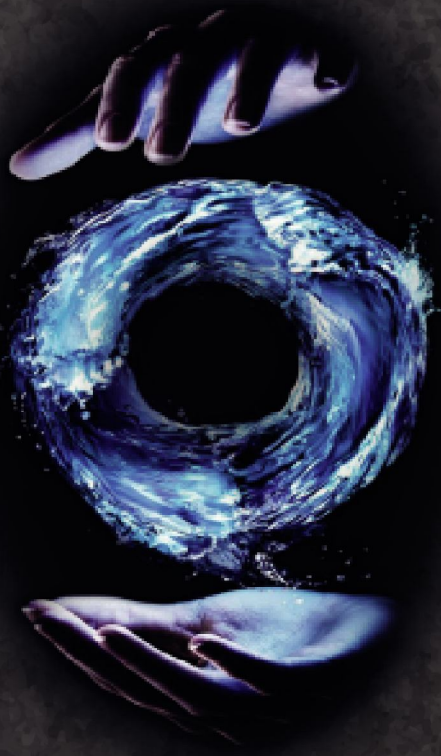
Netarsudil INN 0.02%

BAK Free

Nesudil Plus

Netarsudil INN 0.02% &
Latanoprost USP 0.005%

A Unique drop to control IOP storm in all pathways



Fixed-dose anti-glaucoma that maximizes aqueous humor outflow in all pathways

ARISTOVISION

Ophthalmic Division of
ARISTOPHARMA LTD.