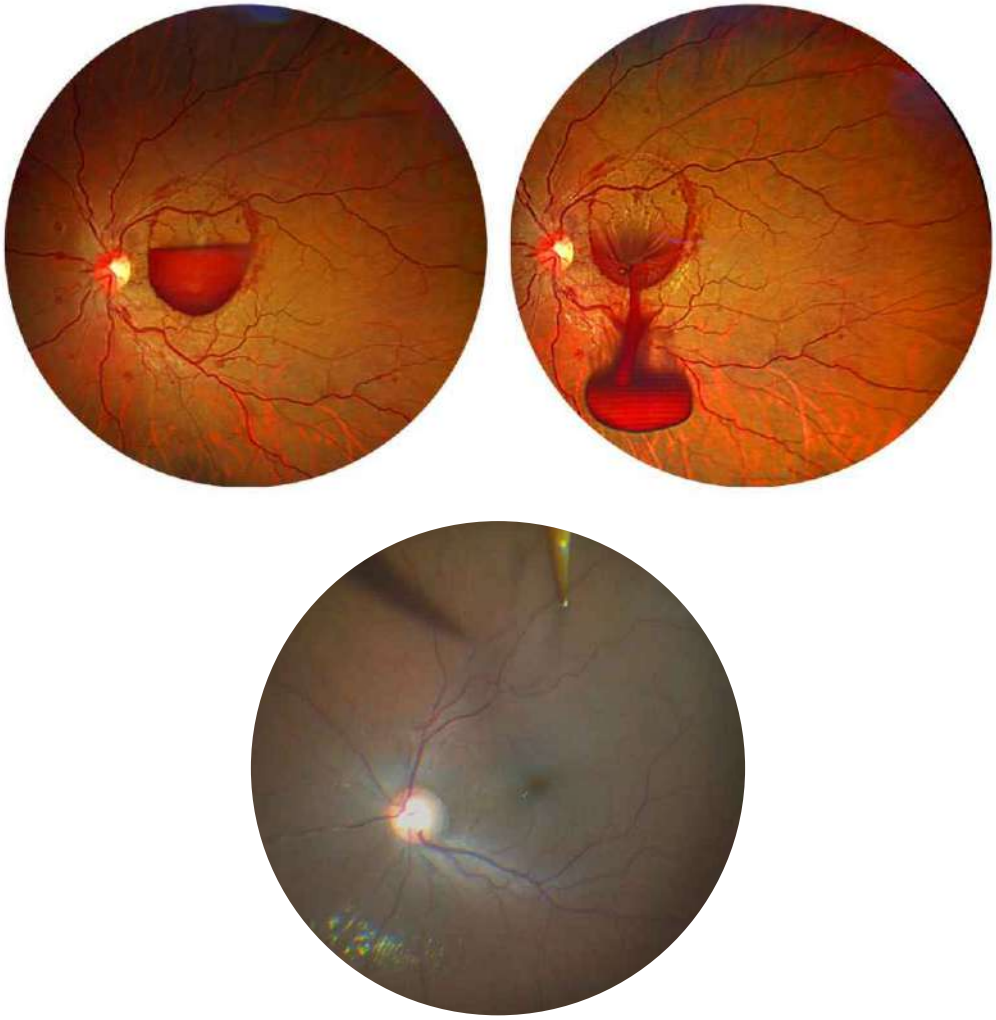
RJO
Rajasthan Journal of Ophthalmology

Official journal of
Rajasthan Ophthalmological Society



Open Access at rosonline.in

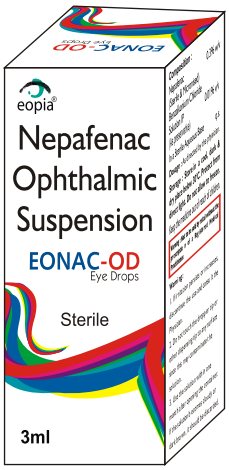
Editor Prof. Dr. Arvind Chauhan I Associate Editor Dr. Raj Shri Hirawat I Vol 12, Issue 1-2, April-Sep. 2023

Eopia Laboratories Pvt. Ltd.

Reduces Pain & Inflammation

Nepafenac 0.3% w/v Ophthalmic Suspension

Nepafenac is a nonsteroidal anti-inflammatory drug (NSAID).
It reduces pain and inflammation in the eyes.Nepafenac ophthalmic suspension is used to reduce pain and swelling after cataract surgery. Nepafenac ophthalmic suspension may also be used for other purposes not listed in this medication guide.



EONAC-OD Eye Drops

3ml Eye Drops

Once A Day Dosage Improves Patient's Compliance

☑ Post Operative Care ☑ Pain & Inflammation

EIBERRY-O3

100% vegan

- Natural Source of **DHA**
- Better Patient Compliance
- Easy Absorption
- Sustainable Source
- No Fishy Aftertaste
- No Impact On Ocean Ecosystem
- 500mg DHA Per Tablet
- Best Choice For Dry Eye Patients

Now Say Good Bye To
Thiamine Deficeincy

ROS EXECUTIVE COMMITTEE

DR. KAMLESH KHILNANI
President
Mob.: + 91 94140 77341
Email : khilnanikamlesh@gmail.com

DR. SANJIV DESAI
President-Elect
Mob.: + 91 97722 14418
Email : dr_S_desai@yahoo.com

DR. VIRENDRA AGARWAL
Vice President
Mob.: + 91 98290 17147
drvirendra@yahoo.com

DR. GULAM ALI KAMDER
Hon. General Secretary
Mob.: + 91 94141 21306
Email : secretaryrosrajasthan@gmail.com

DR. HARSHUL TAK
Treasurer
Mob.: + 91 94140 71910
Email : harshultak@rediffmail.com

DR. VISHAL AGRAWAL
Chairman Scientific Committee
Mob.: + 91 90244 72330
Email : drvishalrpc@yahoo.com

DR. ARVIND CHOUHAN
Executive Member Editor Journal
Mob.: + 91 94140 75663
Email : drarvind111@rediffmail.com

DR. ANKUR SINHA
Executive Member
Mob.: + 91 93146 66881

DR. RAJENDRA KUMAR CHANDEL
Executive Member
Mob.: + 91 99280 87995

DR. RAJESH GOEL
Executive Member
Mob.: + 91 94145 51929

DR. ASHOK KUMAR MEENA
Executive Member - Kota Zone
Mob.: + 91 94145 96822

DR. KARTIKEY KOTHARI
Executive Member - Udaipur Zone

DR. MAHENDRA PALIWAL
Executive Member - Jodhpur Zone

DR. RAKESH PORWAL
Executive Member - Ajmer Zone
Mob : + 91 94140 04414

DR. SONAL KALIA
Executive Member - Jaipur Zone
Mob : + 91 95717 21727

DR. MAHESH PUNJABI
Advisor
Mob : + 91 93525 35488

DR. RAJKUMAR SHARMA
Advisor
Mob : + 91 98290 54797

DR. K.K. KANJOLIA
Immediate Past President
Mob : + 91 92143 11001

DR. SANDEEP VIJAY
Immediate Past Hon. General Secretary
Mob : + 91 94140 65020

Know your Editor

Ist ROS- Rajasthan Ophthalmic Society Conference

Udaipur 1973

"Sometimes all it takes is a good old self pic to bring back hundreds of great memories"

Contents

President Desk

Dr. KAMLESH KHILNANI
Professor and Dr. Kamlesh Khilani
President, ROS
Email: khilanikamlesh@gmail.com

It gives me immense pleasure to write this message for the upcoming RJO 2023.

The ROS should live up to its primary role of providing an academic platform to support the rising aspirations of Ophthalmologists from the state. The Editorial board has gradually but definitely taken all steps to meet this challenge. It is really inconceivable in the modern era to think of young Ophthalmologists, both in private or institutional setup, to be successful without keeping pace with newer techniques, latest appliances and medical research. This is a small endeavor in that direction

I congratulate and express my gratitude to Dr Arvind Chauhan , Editor for bringing out an excellent issue of RJO 2023.

Dr. KAMLESH KHILNANI
President, Rajasthan Ophthalmological Society

Secretary Desk

DR GULAM ALI KAMDAR (MS)
Head & Director of
Dr Kamdar Eye Hospital, Jodhpur
Hon. Secretary ROS
Vice President IMA, Jodhpur
Hon. Secretary UPCHAR, Jodhpur
Email: drgulamali@gmail.com

Dear esteemed members of the Rajasthan Ophthalmological Society,

I hope this message finds you in good health and high spirits. We are thrilled to present the quarterly issue of our Rajasthan Ophthalmological Society (ROS) Journal for 2023.

As always, our journal is dedicated to fostering the dissemination of critical research, advancing medical techniques, and promoting best practices in the field of Ophthalmology across the vibrant state of Rajasthan. This quarter's issue is a testament to the incessant pursuit of our members towards enhancing the quality of eye care in our society.

We are deeply thankful for your continued contributions and engagement, without which this journal would not be possible. The sharing of knowledge is a powerful tool, and we are incredibly proud to provide this platform for the betterment of ophthalmic care in Rajasthan.

We encourage all members to submit their research, case reports, and articles for upcoming issues. The deadlines for the submissions will be communicated separately. Your contribution helps us enrich our collective understanding and pushes the boundaries of ophthalmological science and practice.

Finally, as we continue to navigate these challenging times, we are reminded of the importance of our community. The resilience, dedication, and compassion you have shown throughout this period reaffirm our belief in the power of unity and shared purpose.

Thank you for your unwavering commitment to society and ophthalmology. We hope you find the content of this quarter's journal enlightening and beneficial to your practice.

Best regards,

DR GULAM ALI KAMDAR
Secretary, Rajasthan Ophthalmological Society

Editor Desk

Dr. ARVIND CHOUHAN (MS)
Professor and Head of
Ophthalmology Department
SN Medical College, Jodhpur
Chief Editor RJO

CLIMATIC DROPLET KERATOPATHY: A CALL FOR AWARENESS AND PREVENTION IN THE FACE OF CLIMATE CHANGE

Climatic droplet keratopathy (CDK) is an acquired and possibly debilitating corneal degenerative condition that is common in areas with high levels of sunshine and dry weather. CDK has become a significant problem as global temperatures rise and environmental circumstances change.

This editorial aims to shed light on this condition, its causes, its impact, and the urgent need for awareness and preventive measures.

Climatic Droplet Keratopathy has many other names such as Bietti's band-shaped nodular dystrophy, Labrador keratopathy, spheroidal degeneration, chronic actinic keratopathy, oil droplet degeneration, elastoid degeneration and keratinoid corneal degeneration.

ROLE OF ENVIRONMENT

CDK is characterized by the gradual progressive deposition of yellowish corneal subepithelial deposits. These deposits can hinder visual acuity and lead to discomfort, impacting the quality of life for affected individuals.

CDK predominantly affects males in their forties. Prolonged exposure to ultraviolet (UV) radiation is a primary contributor to CDK. Geographical regions with high sunlight intensity, such as the Mediterranean, Middle East, and certain parts of India like western Rajasthan, report higher prevalence rates. Strong winds, low humidity, and dry climates further exacerbate the condition. Studies have also found Vitamin C deficiency as a contributing factor. Additionally, genetic predisposition may play a role in some cases.

GRADUAL PROGRESSION

Initially, the multiple tiny and tightly confluent translucent subepithelial deposits are localized close to the temporal and/or nasal limbus. Gradually, the haziness spreads over the inferior 2/3rds of the cornea, giving a tarnished appearance.

Advanced cases present with clusters of golden subepithelial droplets of different sizes, some of them 1 mm in diameter, covering the cornea as the disease progresses. Areas of vascularised anterior stromal opacification or fibrosis may be observed.

Once the central cornea is densely compromised, the severe visual loss that ensues may be definitive in these patients. In the advanced stages of the disease, a decrease in corneal sensitivity may lead to corneal trophic changes, perforation, and permanent visual loss.

A grading system proposed by Johnson and Ghosh describes the clinical features of CDK.

Trace: A small number of lesions, found in one eye or only one end of interpalpebral strips in each eye bilaterally

Grade 1: Lesions involving the interpalpebral cornea horizontally but not involving the central cornea

Grade 2: Central corneal involvement without affecting visual acuity

Grade 3: Central corneal involvement with a decline in visual acuity

Grade 4: Grade 3 features with lesion elevation

PROTECTION FROM SUNLIGHT

Individuals living in regions prone to high UV exposure should adopt proactive measures. Wearing UV-protective sunglasses, broad-brimmed hats, and using artificial tears or lubricating eye drops can shield the eyes from harmful radiation and maintain moisture levels. Regular eye examinations are vital for early detection and prompt management.

Creating awareness about CDK is paramount. Healthcare professionals and eye care organizations must collaborate to educate the public about the risks, symptoms, and preventive measures associated with CDK. Public health campaigns and community outreach initiatives can play a pivotal role in disseminating information and encouraging proactive eye care practices.

Management involves lubricating eye drops or artificial tears for symptom relief. In cases where visual impairment is significant, surgical interventions like superficial keratectomy, phototherapeutic keratectomy, lamellar keratoplasty, or penetrating keratoplasty may be considered.

Further research into CDK is necessary to enhance our understanding of the condition's pathophysiology, genetic factors, and treatment options. Investigating innovative treatments, such as targeted medications or interventions, could pave the way for more effective management strategies.

TO CONCLUDE

Climatic droplet keratopathy represents a growing concern for eye health in regions exposed to intense sunlight and dry climates. It is imperative to raise awareness, promote preventive measures, and support research efforts to understand better and manage this condition. By prioritizing eye care and taking proactive steps to protect against UV radiation, we can strive to minimize CDK's impact and safeguard individuals' vision worldwide.

References:

1.Galvis V, Tello A, Martínez JD, et al. Climatic droplet keratopathy: an oxidative stress disorder ? Eye (Lond). 2015;29(2):229-237. doi:10.1038/eye .2014.252

Dr. ARVIND CHOUHAN
Chief Editor - Rajasthan Ophthalmological Society

Associate editor desk

Dr. RAJ SHRI HIRAWAT
MD, FMRF, DNB, FRCS
Vitreo- Retina Consultant at
Dr Kamdar Eye Hospital, Jodhpur
Associate Editor RJO
Email: drrajshreehirawat@gmail.com

Dear Authors and Reviewers,

I hope this message finds you all in good health and high spirits. As the associate editor of this journal, I would like to express my gratitude to everyone who has contributed their research and expertise to our publication.

As the associate editor, it's our role to maintain the highest standards of scholarship. We rely heavily on the expertise and diligence of our reviewers. Your thoughtful and thorough evaluations and commitment to review process are critical in ensuring the quality and integrity of our journal and the wider academic community.

I would like to encourage all authors to carefully review our submission guidelines and formatting requirements before submitting their work. This will help us to ensure a smooth and efficient review process, on time and error free publication and increase the likelihood of acceptance.

As always, if you have any questions or concerns, please do not hesitate to reach out to our editorial team. We are committed to providing a supportive and collaborative environment for our authors and reviewers.

We are also pleased to announce that we are now accepting submissions for image competition and a column for “Art beyond ophthalmology”. If you wish to, please do not hesitate to get in touch with us.

Thank you again for your contributions to our journal, and we look forward to continuing to work with you in the future and publishing next issue soon.

Best Regards

Dr Raj Shri Hirawat
Associate Editor- Rajasthan Ophthalmological Society

"Ophthalmology : From Sam to Sushruta and Beyond"

'Sam' in Hebrew means 'told by Gods'. Truelly, human eyes had great importance in ancient times. The earliest references to eyes are found in the chronicles of ancient Egypt, when Gods of various types were worshiped. The Egyptians referred to the Sun (as God Ra) and the Moon (eye of Horus) as the 'eyes of Gods.' It is believed that before the rulers of Egypt , called 'Pharoahs' came into prominence, the land was ruled by Gods, somewhere 7000- 8000 years before Christ, almost 10,000 years from today.

According to legend, Horus-an Egyptian god, had offered his eye to his father Osiris, to restore his sight. The 'eye of Horus, (fig.1) is the most used ancient Egyptian amulet (insignia of good charm).

In that era, Ophthalmological cures were carried out in temples through prayers, amulets, astrology and magic, and even some herbal drops. Papi Ankh Or Iri, who lived 2200 years B.C., in Egypt, is recognised as the first documented ophthalmologist in history. The civilization of ancient Egypt has most references regarding the work of ophthalmologists, as compared to the rest of ancient civilizations.

Fig.1-The eye of Horus.

Ebers (1550 B.C.) and Hearst (1550 B.C.), are some medical inscriptions which show ophthalmic pathologies, but there is no mention of any surgery.Treatment of ocular ailments was in the hands priests and magicians, since it was believed that the origin of eye diseases was a result of external agents and supernatural causes. Thus medicine in ancient civilizations of Egypt and Mesopotamia (now Iraq and Turkey) was solely in the hands of priests,who practiced medicine through superstition. Even then they dominated medical knowledge which preceded thousands of years of Indian medicine in the era of Sushruta. Later ,the Greek civilization absorbed much of Egyptian medical knowledge, somewhere 1000 to 500 years B.C. Most of these ancient writings have been found engraved on walls ,stones, or on papyrus (bark of trees). Around the same time, some Chinese records have been discovered ,engraved on shells and bones dug out in the ruins of Yin dynasty (1324-1266 B.C.).in Henan proivince. It mentions about 100 drugs, seven of them related to eyes.

Ophthalmology in Ancient India:

The first authentic treatise on Indian medicine is found in 'Sushruta Samhita'. The original copy of this monumental manuscript is not traceable. However, its Sanskrit version was was discovered in 1890 in Kuchar,Chinese Turkistan, and was named after the person who purchased it, Hamilton Bower. The Bower manuscript is currently housed in a library at Oxford. The book was later critically evaluated and was presumed to be a translated copy of Sushruta Samhita,as the name of Sushruta is frequently mentioned, it is believed to be written between 600-500 B.C. The book elaborates a specific surgery for removal of an opacity in the eye which blinds a person. The steps of the operation definitely indicate that it was done for removal of cataract. Though there is some confusion regarding the interpretation of steps of surgery mentioned. This confusion might have originated because of translation of original script non-medical Sanskrit scholar and interpreting ancient vedic Sanskrit. Also the details of surgery mentioned has raised debate whether the operation should be considered an extra-capsular surgery or Couching. Neverthe less, the procedure mentioned is the first authentic document of eye surgery in ancient world. Sushruta describes the surgery using a sharply pointed instrument with a handle fashioned into a trough. His ability to manage many eye conditions at the time of limited resources, is a testament to his virtuosity and called as 'Father of Indian Ophthalmology' ,is a true tribute (Fig.2).

Sushruta's observations of eye ailments and treatment, preceded at least 200 years to other scientists. Renowned as Sushruta, another great physician , Hippocrates, lived around 400 B.C. Hippocrates is widely acclaimed as a physician and teacher. He wrote, taught and practiced medicine in Greece.

He travelled widely and his practice included ocular treatment also. Since no modern gadgets were present, eyes were observed through magnifying lenses and so only the external eye could be viewed. Since dissection of dead bodies was prohibited in Greek mythology, most of anatomy was deduced by animal dissection. It was then detected that eye had many layers and there was fluid in the eye, which travelled through a tube to the brain and initiate vision. Hippocrates was the first physician to describe brain and its importance.

Medevial history (4th to 14th century A.D.):

Ophthalmolgy in this period remained almost dormantr and is often spoken as the 'Dark age'. Persia (now Iran) came into prominence with the rise of many scholars.Rhazes, in 8th century A.D., was a renowned and revered physician of Persia who practiced medicine and ophthalmology.

Revolutionary work in the field of optics was achieved by Ibn-Al-Hathem in 10th century A.D. In his book on optics -Kitab-al-Manzir (see fig.3); he described the the theory of vision where seeing process was facilitated by light rays radiating from an object to the eye. Though no further details were given, this theory is in line with the mechanism of vision. His observations opposed the very prevalent greek theory of 'Intromission' whereby rays emanated from the eye to the object.

Fig 3- Book by Al-Hathem

During this era, couching became very popular as the patient's vision was restored immediately and was widely used in the western world also, as a standard surgery for cataract.

Fig 3 -Couching

Early modern era (14th to 18th century):

14th century onwards witnessed the era of so called 'Renaissance', a fervent period of rebirth of ophthalmology. The physicians practicing eye ailments were called 'oculists', a term adapted from Latin. Many great leaps in eye anatomy happened as dissection of human body was practiced and taught. The discovery of cryatalline lens, iris, and inner parts of eye was discovered. Though it was still unknown why the pupil changes its size. It was around this time that full cataract extraction in western world was performed by Charles Saint Yves in 1707. George Bartisch, a German physician in 16th century , wrote extensively on eye diseases and was perhaps the best celebrated oculist of his time. In 1722, Saint Yves published a treatise of eye pathologies that became an established book of French school of ophthalmology. The 18th century has credence for a great German anatomist, Gottfried Zinn, who is often regarded as the Father of ocular anatomy. Zinn provided the first layer-by-layer description of various ocular structures.

Modern Ophthalmology :

One after other, pathbreaking ophthalmic inventions and innovations paved the way for discovering the intricate physuiology and pathology of ocular system. The invention of Ophthalmoloscope, by German ophthalmologist Herman Von Helmholtz (1821-1894), offered unprecedented diagnostic capabilities that revolutionised the practice of ophthalmology.

Albert Von Graeffe (1828-1878) further reformed ophthalmology ophthalmology by numerous inventions and surgical procedures, and is often called the Father of modern ophthalmology.

As years passed, numerous inventions followed, which changed the face and future of ophthalmology. The understanding and management of eye diseases changed for the better. The following, in brief, are some important persons whose contribution to the science of ophthalmology is remarkable:

Sir William Bowman (1816-1892) ophthalmic anatomy; Alivar Gullstrand (1862-1930)- Invention of slit-lamp; Carl Ziess (1816-1888)- ophthalmic lenses; Hermann Snellen (1804-1888) Snellen vision chart ; Jules Gonin (1870-1935)- pioneer in retinal surgery ; Gerhard Meyer-Schwickerath (1920-1992)- light photocoagulation ; Sir Harold Ridley (1906-2001) Intraocular lenses ;Charles Kelman (1930-2004) Phacoimulsification ; Jules Hircshberg (1886) Hirschberg test in strabismus; Hans Goldman (1899-1991)-Applanation Tonometry ; Syvatoslov Fyodorov (1927-2000) Radial keratotomy ; Gholam peyman (DOB-1937)-Lasik 1991; David Huyang & Eric Swanson Optical Coherence Tomography. The article will not be complete without mentioning and paying tribute to some genius ophthalmologist whose outstanding contributions earned them the prestigious Nobel Prize :

1) Alivar Gullstrand -A Swedish ophthalmologist, was awarded Nobel Prize in 1911,for his work on ophthalmic optics and his significant contribution for understanding the refractive system of eye.

2) David Hubel and Torsten Wiesel Won Nobel Prize in 1981, for pioneering work on Cortical Visual Physiology.

The list will keep on increasing as more inventions and pathbreaking innovations will continue to advance our knowledge of ophthalmology for the benefit of human society.

Guest Article

PROF. (DR). YOGESH SHUKLA

Ms. (Ophthalmology)
From S.M.S Medical College,
Jaipur In 1979.

Retd. Professor,
From S.M.S Medical College,
Jaipur.

• **Currently**, Advisor- Professor, Deptt. Of Ophthalmology, Nims Medical College, Jaipur And Private Practiceowner- Rajasthan Nursing Home & Eye Center, Jaipur.

Further Qualifications :

• Fellowship In 'comprehensive Ophthalmology' Eye Foundation Of America, W. Virginia, U.s.a. (1997)

• Ellowship In ' Pediatric Ophthalmology & Strabismus'- Johns Hopkins Univ. Hospital, U.s.a. (2000).

Positions Held :

• Formerly,memberacademic & Research Committee Of Aios. (all-india Ophthalmology Society) .

• Former, Member- Management Committee Aios (All-india Ophthalmology Society) .

• Formerly- Secretary, Ocular Trauma Society Of India. (otsi).

• Formerly, Secretary & President, Raj. Ophthalmology Society (ros).

• **Resently**

Vice-president : Strabismus & Pediatric Ophthalmology Society Of India (sposi).

Academic Achievements & Awards.

1. Author Of Three Books On Various Aspects Of Pediatric Ophthalmology & Strabismus.

A) "Management Of Refractive Errors & Spectacle Prescription." Jaypee Brothers Publication, 2016.

B) "Visual Anomalies In Children".- CBS Publications, 2019.

C) "Clinical Pediatric Ophtrhalmology & Strabismus".

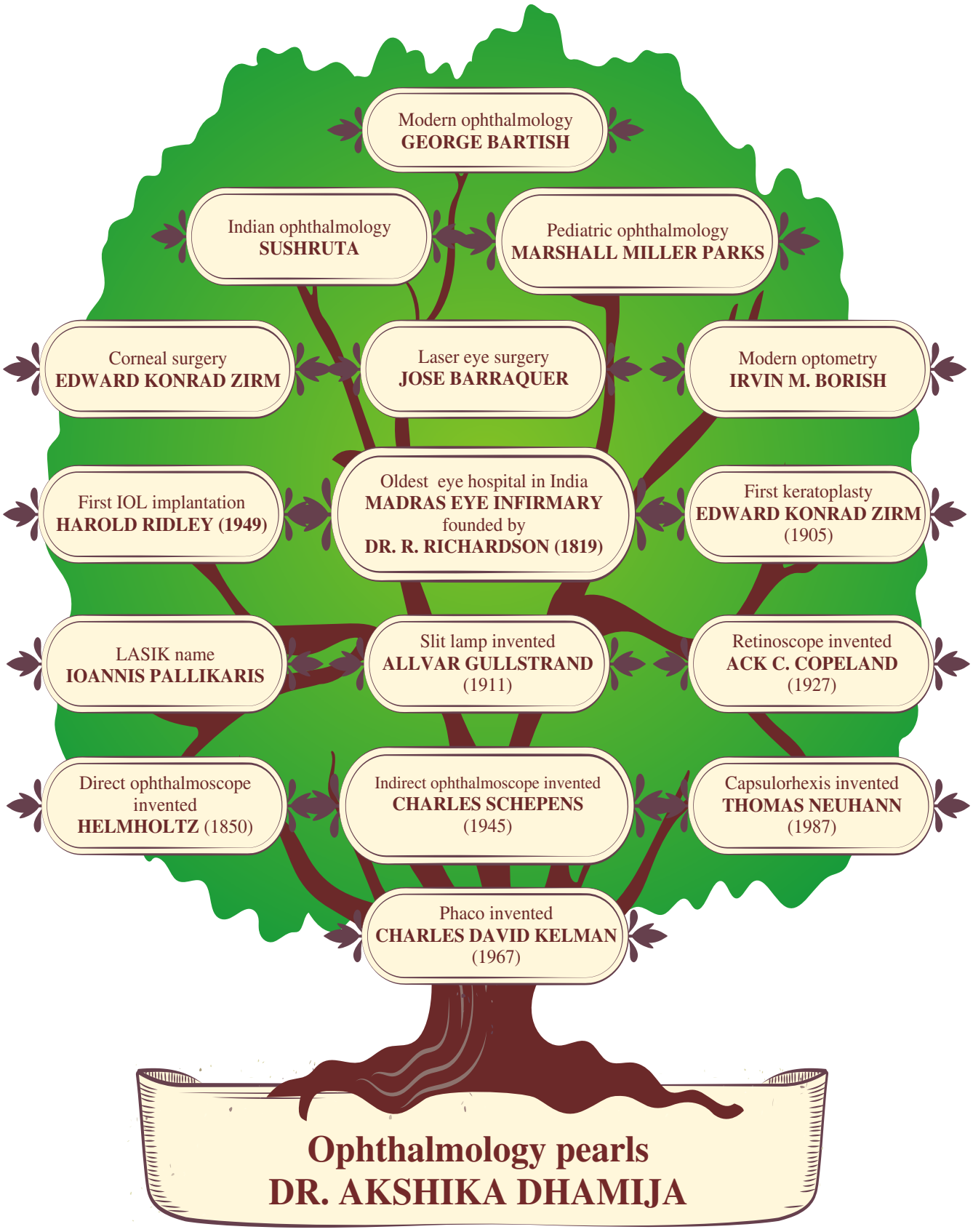
Comprehensive, Complete Text-book Published By Jaypee Brothers, 2022.

2. Awarded " Medical Achievers Of Rajasthan State" Award By Times Of India Group, In 2014.

3. "life-time Achievement Award " For Exemplary Services In Ophthalmology . Awarded By Rajasthan State Ophthalmology Society.,2021.

4. 'life -time Achievement Award "by Indian Medical Council (ima), Rajasthan Chapter, 2021.

5. "life- Time Achievement Award" By Strabismus & Pediatric Society Of India, 2016.


Modern ophthalmology
GEORGE BARTISH
Indian ophthalmology
SUSHRUTA
Pediatric ophthalmology
MARSHALL MILLER PARKS
Corneal surgery
EDWARD KONRAD ZIRM
Laser eye surgery
JOSE BARRAQUER
Modern optometry
IRVIN M. BORISH
First IOL implantation
HAROLD RIDLEY (1949)
Oldest eye hospital in India
MADRAS EYE INFIRMARY
founded by
DR. R. RICHARDSON (1819)
First keratoplasty
EDWARD KONRAD ZIRM
(1905)
LASIK name
IOANNIS PALLIKARIS
Slit lamp invented
ALLVAR GULLSTRAND
(1911)
Retinoscope invented
ACK C. COPELAND
(1927)
Direct ophthalmoscope
invented
HELMHOLTZ (1850)
Indirect ophthalmoscope invented
CHARLES SCHEPENS
(1945)
Capsulorhexis invented
THOMAS NEUHANN
(1987)
Phaco invented
CHARLES DAVID KELMAN
(1967)
Ophthalmology pearls
DR. AKSHIKA DHAMIJA

"Pearls For Wound Construction In Phacoemulsification For Beginners"

Dr. Ashok Kumar Meena[1], Dr. Vanshika[1]
1 : Department Of Ophthalmology, Government Medical College, Kota (Raj.)
Email Dr.ashokmeena10@gmail.com

Cataract incision construction is of utmost importance in phacoemulsification cataract surgery. The initial wound construction influences the fluidic balance of the anterior segment, lays the foundation for all additional steps of the surgery, and plays an important role in the immediate post-operative period when the wound is most unstable [1]. Additionally, the creation of a watertight, self-sealing wound helps to prevent subsequent infections [2,3]. Conversely, a poorly constructed wound increases the risk of surgical and post-operative complications [4,5]. A properly executed phaco incision allows for a smoother operation, faster recovery, and improved visual outcomes for the patient.

ANATOMY OF LIMBUS

Surgical Limbus can be divided into two zones by three lines (Figure 1): Anterior Limbal Border : corresponds to termination of bowman's membrane and is marked externally by insertion of tenon's capsule and conjunctiva that forms prominent ridge .
Middle Limbal Border : when conjunctiva and Tenon's capsule is dissected there is bluish zone visible followed by a white zone of sclera. The junction between these two is known as middle limbal border . This is termination of Descemet's membrane and overlies Schwalbe's line.
Posterior Limbal Border : lies over scleral spur and can be seen only with sclerotic scatter . It is 1mm behind the middle limbal border.

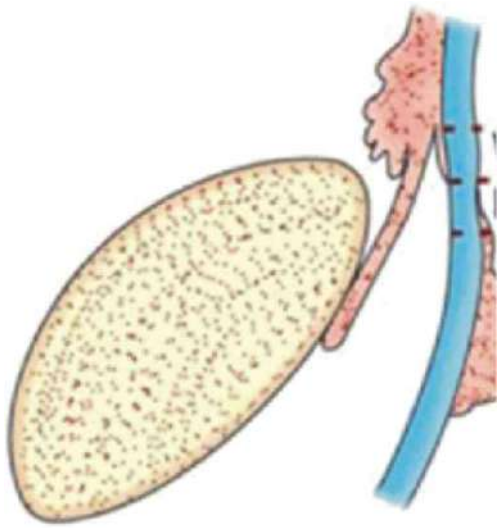


Figure 1 Surgical Limbus

ASTIGMATIC NEUTRAL FUNNEL

The concept has been derived from two important mathematical equations :
• Surgically induced astigmatism (SIA) is directly proportional to length of incision.
• SIA is inversely proportional to distance of incision from corneal centre.
Therefore it is found that incision of 3-3.5 mm at the limbus results in minimal astigmatism of 0.25 - 0.50D and it can be taken as astigmatically neutral for all cases. The funnel's base is at limbus and as it moves away it widens (Figure 2). The incision made in this funnel is astigmatically neutral.

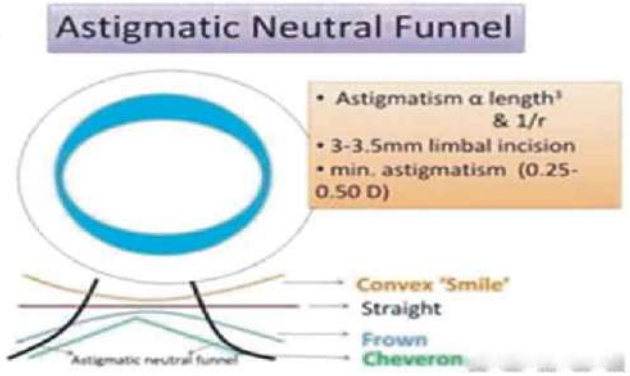


Figure 2. Astigmatic Neutral Funnel

SELF SEALING INCISION

It is characterised by corneal valve and square incisions. When IOP of the eye rises it causes corneal valve to close against the pressure of aqueous so that it is pushed up against the dome of cornea. The smoother and larger is corneal lip, better is sealing action.

CLASSIFICATION OF SMALL INCISION

Small incision means any incision having size of 5 mm or less. These can be classified into following categories: • Location • Position • Size • Shape

Depending on the location

The position of the incision influences the degree of SIA due to the differing distances of each location to the central visual axis [6]. Common incision positions include temporal, superior, and nasal.
• Temporal incisions induce a lower degree of SIA than superior ones due to the closer proximity of the superior limbus to the central visual axis, and offer better surgical accessibility for the surgeon due to decreased brow obstruction [6].

• Temporal and nasal incisions have comparable corneal and astigmatic changes 8-weeks post-operatively, though the changes in the nasal approach are greater in the early postoperative period. As a result, temporal vs. nasal approach can be selected based on surgeon preference [7]. The presence of pre-existing astigmatism also influences the position and number of corneal incisions used [8].

• Superior incision is recommended for with-the-rule astigmatism (>1.5 D) and steep axis at 90 degrees.

• Temporal incision is recommended for :

• <1.5 D and steep axis at 90 degrees,
• negligible astigmatism, or
• against-the-rule astigmatism <0.75 D and steep axis at 180 degrees.

• Nasal incision is recommended for >0.75 D of astigmatism and steep axis at 180 degrees.

• Paired opposite Clear corneal incision at the temporal and nasal positions can reduce pre-existing corneal astigmatism (>1.5 D) compared to a single incision [9].

While the meridian is used to determine the position of the incision, landmarks such as the terminal vessels in the limbal arcade and incision distances anterior to the limbus are used to determine the precise location of the initial incision. Incision distances ranging from 0.5-1.5 mm anterior to the limbus have been found to be safe and effective in phacoemulsification [10].

• The incision should include slight nicking of the surrounding limbal blood vessels, which will help seal and strengthen the healing incision. A vascular, near-clear incision is preferred over a non-vascular, true clear incision, as a non-vascular incision can lead to a weaker wound that requires a longer healing time due to a delayed fibroblastic response compared to vascular incisions [11].

Depending on the Position

Incision can be of following types :

• Corneal • Limbal • Scleral • Sclerocorneal

Astigmatism decreases as incision moves from clear cornea to sclera.

CORNEAL INCISIONS

The incision is known as clear corneal when external edge is anterior to limbal vascular arcade.

• Advantages

• Self-sealing, sutureless wound
• Shorter procedure time
• Faster visual recovery
• Can be used as a refractive tool for pre-existing astigmatism
• Can be used with topical anaesthesia• Wound stability during surgery
• Decreased risk of bleeding due to minimal to no conjunctival manipulation
• Lower incidence of hyphema, which is more favorable for patients on anticoagulants

• Disadvantages

• Higher rates of end ophthalmitis
•Higher rates of regular and irregular surgically-induced astigmatism • Wound leaking
• Increased loss of endothelial cells and endothelial gap
• Wound dehiscence following trivial trauma
• Induction of irregular astigmatism
• Descemet membrane detachment with ragged CCI
• Hypotony **• Contraindication**
• Preoperative radial keratotomy where the incision extend as far as limbus

Figure 3: Clear Corneal Incision

LIMBAL INCISIONS

When external incision is made 0.5 mm posterior to the external arcades then it is called limbal incision.

• Advantages

• Induce less astigmatism
• Heal more rapidly
• Cause less discomfort
• Greater resistance to pressure with respect to clear corneal incision.

• Disadvantages

• Ballooning of conjunctiva leading to poor visibility
• Increased risk of subconjuctival hemorrhage
• Bleeding from limbal vessels can track into tunnel resulting in staining of tunnel.

• Relative contraindications

• Patients with increased bleeding tendency like those on anticoagulant therapy, patients with blood dyscrasias .

SCLEROCORNEAL INCISION

These incisions are made electively when a larger incision of 5 mm or more is needed to implant an IOL . These are sometimes used in paediatric cataract surgery for implanting rigid IOLs . These incisions have better sealing properties. These incisions are made 1.5 2.0 mm posterior to the limbus (Figure 4). They can be sutureless if the tunnel is created with an internal corneal lip.

The scleral flap incision has three dimensions:

• Depth ranges from 0.1 mm to 0.5 mm. Flap depth can be determined accurately with a guarded calibrated diamond knife.
• Width defined as distance between the external groove and the internal entry into the anterior chamber .Wider the flap, lesser is the astigmatism.
• Length size of astigmatically neutral incision can be upto 4.5 mm.

• Advantages

• Advantages

• Minimal astigmatic induction

• Better resistance to both external and internal pressure. **• Disadvantages**

• risk of conjunctival trauma arises from the use of more instruments

• cautery is necessary.

• Greater time for wound reconstruction

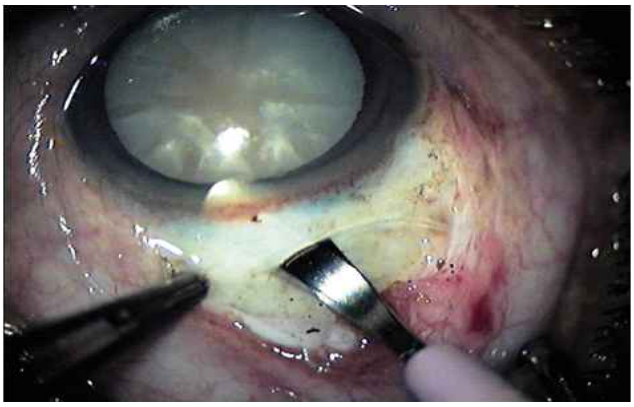


Figure 4. Sclerocorneal incision

Depending on the shape

On longitudinal section, incisions can be divided into 4 types. It is based on the number of incision planes that are used to construct the wound.

1. Uniplanar (Figure 5) single plane, one stab incision.

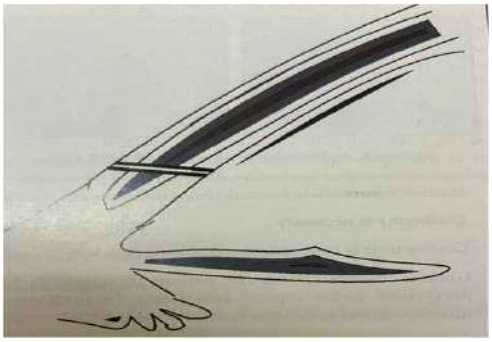


Figure 5. Uniplanar Incision

2. Biplanar incision (Figure 6)-

Figure 7. Biplanar incision

3. Triplanar incision(Figure 8.) :

Figure 8. Triplanar incision

4. Hinged incision(Figure 9) :

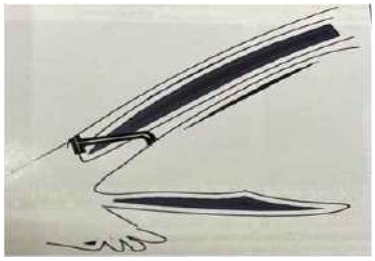


Figure 9. Hinged incision

The three step incision provide the maximum safety as it decreases the risk of the ingress of bacterial-contaminated fluid, and subsequent post-operative endophthalmitis [12]. Frown incision is most stable as it prevents sliding between roof and floor of the tunnel; thereby minimizing astigmatic shift.

Depending on the length

The size of incision depends on the size of lens to be implanted and the diameter of the phaco probe. Initially a small incision is made for the phacoemulsification process, which is then enlarged for IOL implantation.

The length of incision for phacoemulsification varies according to the kind of phaco machine being used. In preparation of the tunnel, it is necessary to use a knife that is proportional to the size of the phaco tip, a tunnel that is too narrow may obstruct the irrigation of the sleeve and cause corneal burns, a tunnel that is too large may result in intraoperative leakage which may also be responsible for loss of depth of the anterior chamber. Usually this length varies from 2.5 mm to 3.2 mm.

SURGICAL TECHNIQUE

Construction of clear corneal incision :

1. Stabilize the globe with fixation forceps or ring.
2. A Side port is created with the help of MVR knife .
3. The eye should be firm and this can be achieved by injecting viscoelastic from the sideport.
4. Make 300 micrometer groove at anterior edge of vascular arcade.
5. An incision is made by depressing the posterior edge of groove with a 3.2 mm or 2.75 mm keratome flattening the blade against the surface of eye.

6. The keratome is moved in the plane of cornea until the shoulders, which are 2 mm posterior to the point of knife, touch the external edge of the incision and then a dimple down technique is utilized to initiate the cut through Descemet's membrane.
7. Pressure is applied gently for the blade tip to emerge into the chamber, when the blade is again turned into a horizontal direction. This is done to produce a straight line internal opening.
8. After phacoemulsification and cortical clean up, the incision in the descemet's membrane is widened with a blunt tipped keratome depending upon the IOL to be implanted.
9. After the anterior chamber is pressurized by BSS through the sideport, the lips of the wound is tested by applying pressure with the sponge against the posterior lip of the wound. If the incision leaks, a single 10-0 nylon monofilament suture is placed.
10. At last stromal hydration of the clear corneal incision is done in order to seal it.

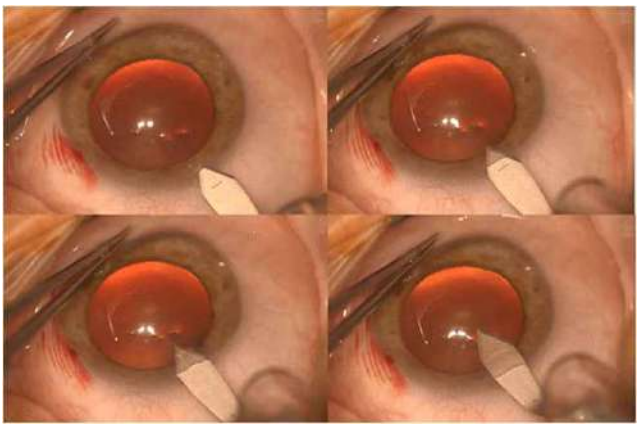


Figure 10. Clear Corneal Incision being made

CLEAR CORNEAL INCISION RELATED PROBLEMS AND SOLUTIONS

INTRAOPERATIVE

Short tunnel. If the tunnel is too short, the corneal valve may not self-seal, resulting in wound leakage. When this occurs, placement of sutures may be necessary.

Long tunnel. For any given incision site, the closer the incision is to the central cornea, the greater its tendency is to alter cylinder along that axis. Proximity to the central cornea will also increase endothelial cell loss. One way to avoid these problems is to create a longer tunnel incision. However, this brings its own set of problems. Instruments introduced through a long tunnel will be inclined upward toward the endothelium, but work in the anterior chamber requires the surgeon to force the instruments downward. This may result in traction folds, which decrease visibility in the anterior chamber. In this scenario, surgical maneuvers are more

Superficial incision. A thin corneal flap can be damaged by the phaco tip or other instruments and may eventually tear. Such an incision is usually not watertight and must be sutured.

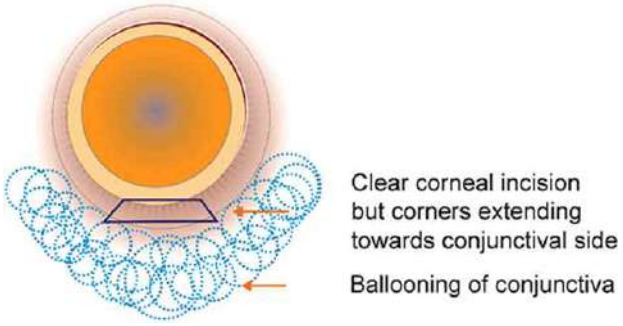
Deep incision. Using pre calibrated instruments may avoid creating incisions that are too deep. If the eye becomes hypotonic, a 10-0 nylon suture can be placed to close the original incision; another entry can then be made.

Big wound. If the keratome entry is too large for the phaco handpiece, excessive fluid outflow can lead to shallowing of the anterior chamber. This situation can be managed by placing an interrupted suture across the main incision.

Poorly shaped incision. If the shape of the incision is not accurate, it may result in unequal distribution of tension and induced astigmatism.
Detached Descemet membrane. Improper insertion of the instrument used for incision creation may tear the

Descemet membrane. at the anterior chamber entry site. This commonly occurs when the instruments are blunt or if penetration into the anterior chamber is too tangential, as the tip of the instrument may drag the Descemet membrane with it. To avoid this, the leading tip should be directed posteriorly whenever an instrument is inserted. It is important to recognize an early tear in the Descemet membrane to avoid its extension. At the end of the procedure, the membranes can be reattached using an injection of ophthalmic viscosurgical device (OVD) or an air bubble into the anterior chamber. Larger tears may require more extensive suturing.

Conjunctival infiltration by balanced saline solution. A limbal incision placed too posteriorly may allow balanced saline solution to fill the conjunctival sac adjacent to the wound. This can produce a pool of fluid over the cornea and distort the view of anterior chamber structures. A small peritomy allows the balanced saline solution to escape.



IRIS PROLAPSE

The cause : Premature or too posterior entry of the incision may invite iris prolapse, which can damage the stroma or iris sphincter and result in postoperative pupil irregularities, transillumination defects, peripheral anterior synechia, or uveal incarceration into the incision. Intraoperatively, pupil constriction and iris bleeding may further complicate the operation. However, constructing the incision well, minimizing iris trauma, and reducing positive pressure will decrease the likelihood of iris prolapse. Additionally, care should be taken to avoid excessive injection of fluid and OVD behind the iris.

The solution: Identify and treat the underlying cause:

If iris prolapse occurs despite your precautions, proper management starts with identifying the underlying cause :

• If iris prolapse is caused by excessive IOP, it may be reduced by repositioning the speculum, adding an orbicularis block to the eyelid, or aspirating a small amount of fluid or OVD from a separate incision site. The iris can be repositioned gently using a small amount of OVD or a blunt iris spatula via a paracentesis incision. If these methods fail, a peripheral iridectomy may help to neutralize the pressure gradient between the anterior and posterior chambers and facilitate iris repositioning.

• If the prolapse results from posterior entry, hydrodissection can be performed via a paracentesis site. Phacoemulsification can then be performed after the tip is safely introduced into the anterior chamber, keeping it in place and thus plugging the incision. If these measures are unsuccessful, the surgeon may consider making an incision at any other location. Aggressive attempts to reposition the iris without alleviating the underlying cause may result in serious iris damage.

POSTOPERATIVE

Postoperative hypotony may be seen in cases of poor sealability of incision. Wound leak and iris prolapse can occur in infrequent case especially if wound size is more than 3.5 mm width. Increased risk of endophthalmitis has been noted in a large meta analysis in case operated via clear corneal incision of more than 4 mm size in comparison to sclero corneal incision.

CONCLUSION

It is common dictum that 'well begun is half the work done.' The incision used for cataract surgery has to serve 3 purposes the ease of performance of phacoemulsification, minimum astigmatism induction, safety and self sealability of incision. Smaller the size of incision and proper wound construction has transformed cataract surgery with clear corneal incision coming into play, the surgery can be done under topical anaesthesia with relative astigmatic neutrality and almost instant visual rehabilitati on.

REFERENCES

1. Donnenfeld E, Rosenberg E, Boozan H, Davis Z, Nattis A. Randomized prospective evaluation of the wound integrity of primary clear corneal incisions made with a femtosecond laser versus a manual keratome. J Cataract Refract Surg. 2018;44(3):329-335.
2. Elkady B, Piñero D, Alió JL. Corneal incision quality: microincision cataract surgery versus microcoaxial phacoemulsification. J Cataract Refract Surg. 2009;35(3):466-474.
3. Sykakis E, Karim R, Kinsella M, Bhogal M, Patel S, Parmar DN. Study of fluid ingress through clear corneal incisions following phacoemulsification with or without the use of a hydrogel ocular bandage: a prospective comparative randomised study. Acta Ophthalmol. 2014;92(8):e663-e666.
4. Rodrigues R, Santos MSD, Silver RE, Campos M, Gomes RL. Corneal incision architecture: VICTUS femtosecond laser vs manual keratome. Clin Ophthalmol. 2019;13:147-152. Published 2019 Jan 10.
5. Teixeira A, Salaroli C, Filho FR, et al. Architectural analysis of clear corneal incision techniques in cataract surgery using Fourier-domain OCT. Ophthalmic Surg Lasers Imaging. 2012;43(6 Suppl):S103-S108.
6. Nikose AS, Saha D, Laddha PM, Patil M. Surgically induced astigmatism after phacoemulsification by temporal clear corneal and superior clear corneal approach: a comparison. Clin Ophthalmol. 2018;12:65-70.
7. Hayashi K, Sato T, Yoshida M, Yoshimura K. Corneal shape changes of the total and posterior cornea after temporal versus nasal clear corneal incision cataract surgery. Br J Ophthalmol. 2019;103(2):181-185.
8. Tejedor J, Murube J. Choosing the location of corneal incision based on preexisting astigmatism in phacoemulsification. Am J Ophthalmol. 2005;139(5):767-776.
9. Razmjoo H, Koosha N, Vaezi MH, Rahimi B, Peyman A. Corneal astigmatism change and wavefront aberration evaluation after cataract surgery: "Single" versus "paired opposite" clear corneal incisions. Adv Biomed Res. 2014;3:163.
10. Wang L, Zhao L, Yang X, Zhang Y, Liao D, Wang J. Comparison of Outcomes after Phacoemulsification with Two Different Corneal Incision Distances Anterior to the Limbus. J Ophthalmol. 2019;2019:1760742.
11. Ernest PH, Lavery KT, Kiessling LA. Relative strength of scleral corneal and clear corneal incisions constructed in cadaver eyes. J Cataract Refract Surg. 1994;20(6):626-629.
12. May W, Castro-Combs J, Camacho W, Wittmann P, Behrens A. Analysis of clear corneal incision integrity in an ex vivo model. J Cataract Refract Surg. 2008;34(6):1013-1018.

Author
Dr. Ashok Kumar Meena
MS Ophthalmology
Senior Professor,
GMC Kota, Rajasthan

Author
Dr. Vanshika
P.G. Second Year Resident
GMC Kota , Rajasthan

Posterior Polar Cataract Management: My Approach

Dr Sudhir Singh, MS
Senior Consultant & HOD
JW Global Hospital Research Centre
Mount Abu, India, 307601
https://sudhir.info/
http://squintmaster.com/

Introduction

Posterior polar cataracts (PPC) are the cataracts lying on the posterior pole of the lens. They are slicked to the posterior capsule, so there are many times more chances of the post capsule ruptures and related sequelae. In this article I am going to share my approach.

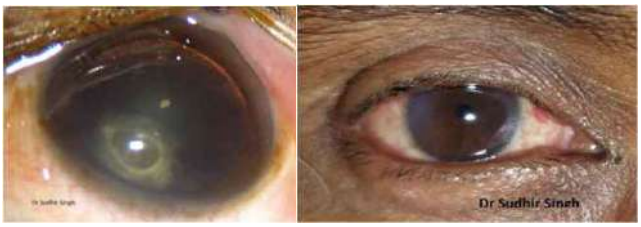
Pre operative considerations and plans

1. Patient Counseling: The patient counseling is very important and it requires substantial chair time with patient and relative to explain about the complexities of the disease, procedure, chances of re-surgeries in written.
2. Anesthesia and Akinesia: My prefer choice is peribulbar local anesthesia with good akinesia.
3. Capsulorhexis Size: I prefer moderate size central capsulorhexis
4. Hydro Procedures: I prefer hydro delineation and gentle hydro dissection. Many surgeons do not advised to do hydro dissection. I found the hydro-dissection in the posterior capsular cataracts very useful as it separates the epinucleus from the posterior capsule by the most natural way .The hydro delineation in the posterior cataracts also very beneficial as it separates nucleus from the epinucleus. Fine et al.40 used minimal hydrodissection and hydrodelinealtion, nuclear emulsification from within the epinuclear shell and gentle viscodissection of the epinucleus and cortex to avoid unnecessary pressure on the posterior capsule and to protect the region of the greatest potential weakness throughout the procedure 4.
5. Intraocular Lens: If posterior capsule remains intact then any hydrophobic lens if I have planned phacoemulsification. Poly methyl meth acrylate (PMMA) intraocular lens for manual small incision cataract surgery (MSICS) and posterior capsule rupture with intact anterior capsulorhexis. In case of the medium, large posterior capsule rent (PCR) and the sulcus ,my preferred lens is PMMA IOL.
6. Always keep your vitrectomy machine on standby

Management

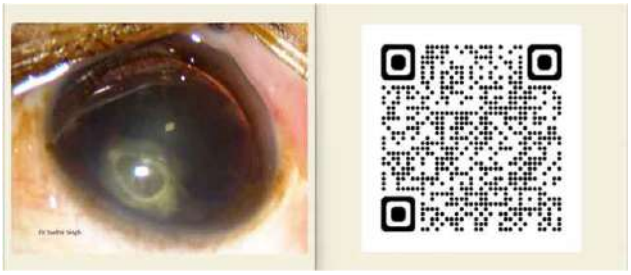
Posterior polar cataract management options

1. Manual Small Incision Cataract Surgery (MSICS) The MSICS is low pressure, no turbulence and inside out procedure. The posterior capsule is weak posterior polar cataracts. The MSICS does not put extra pressure on the posterior capsule in contrast to phacoemulsification. The phacoemulsification is high pressure, high turbulence and outside in procedure. It put more pressure on the already weak posterior capsule due to the posterior polar capsule. The manual small incision is the procedure of choice.



Pre operative and post operative day 1 vision 6/9 undaided and 6/6 corrected follwing 6 mm manual small incision cataract surgery

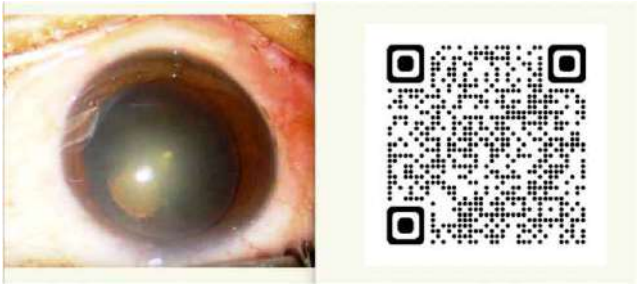
Please follow the link or QR code for the surgery video of the manual small incision cataract surgery on the YouTube https://www.youtube.com/watch?v=2ICFx-Y2eAc



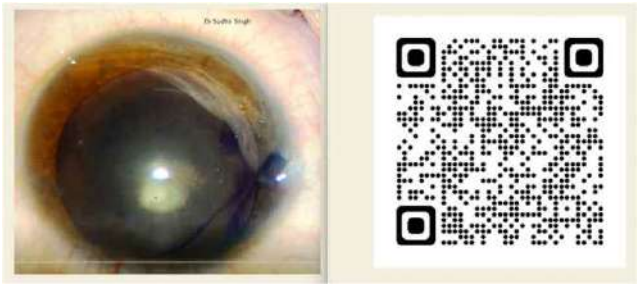
2. Phacoemulsification in the posterior polar cataract

The phacoemulsification is technically less safe the manual small incision cataract. I plan medium sized centrally located capsulorhexis gentle hydro-dissection and hydro delineation is done. The nucleus is emulsified with low parameter. Till this step everything is easy. The posterior pole cortex removal is the main challenge. The remaining cortex removed very gently and the anterior chamber should be stable as much as possible.

Please follow the link or QR code for the surgery video of phacoemulsification In the Posterior Polar Cataract on the YouTube https://www.youtube.com/watch?v=62v78L4SoWU



Please follow the link or QR code for the surgery video of phacoemulsification In the Posterior Polar Cataract on the YouTube https://www.youtube.com/watch?v=1w RRv5dPiDo&t=7s



Femto Laser Assisted Cataract Surgery (FLAC)

Some surgeon advocating for the femto Laser Assisted Cataract Surgery. But it does not increase the safety of posterior capsule as the posterior capsule rupture takes place during the cleaning of the cortical matter. The nucleus management is not an issue in the posterior capsular cataracts. It can be easily managed by either in the manual small incision cataract surgery or by the standard phacoemulsification. Vasavada and Singh found that rupture occurs most commonly during epinucleus removal in phacoemulsification2. While Osher et al. found it to happen during removal of the posterior polar opacity or during cleaning of the posterior capsule after plaque removal In my opinion, its misuse of the technology without any benefit and patients pay more unnecessarily3.

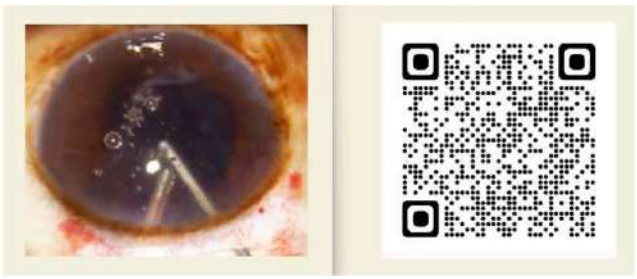
Management of posterior capsule ruptures

Despite the all precautions if posterior capsule ruptures. The management as follows

Vitrectomy after vitreous prolapse

The aim of anterior vitrectomy is to remove all vitreous strands from the anterior chamber, making sure that no vitreous is incarcerated in the incisions. Bimanual anterior vitrectomy is a simple procedure that every cataract surgeon should master. First, the vitrectomy cutter and irrigating cannula are passed through different side port incisions. Flow from the irrigation cannula should be directed toward the angle of the anterior chamber. A low bottle height, high cut rate (6001,000 cuts/sec), and low aspiration rate (150200 mm Hg) will minimize vitreous traction. The vitreous cutter is passed through the PCR into the vitreous cavity; its port is positioned just behind the posterior capsule to minimize the risk of PCR enlargement during vitrectomy. Most of the vitreous that has prolapsed into the posterior and anterior chambers can be easily drawn backward and removed. Preservative-free intracameral triamcinolone acetonide may be used to enhance vitreous visibility[1].

Please follow the link or QR code for the surgery video of the bimanual anterior vitrectomy HDon the YouTube
https://www.youtube.com/watch?v=GtlRZjAsIgA

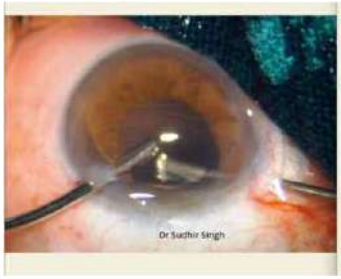


IOL implantation after the posterior capsular rupture Protocol for a small posterior capsular rupture:

After a small posterior capsule rupture, the remaining nuclear fragments and cortical matter are removed from the capsular bag. If any vitreous is present, vitrectomy should be used to clear the posterior chamber. The posterior capsule rupture is then sealed with a cohesive OVD, the capsular bag is inflated with a dispersive OVD, and the IOL is implanted in the bag with the leading haptic directed toward the capsular bag equator and the trailing haptic left outside of the bag. The IOL can then be dialed gently into the capsular bag[1].

A one-piece PMMA IOL is much easier to implant than a foldable IOL, as control over PMMA IOLs is easier. After the lens is implanted, it is important to remove OVD thoroughly, as residual OVD can produce a severe inflammatory reaction in the anterior chamber and vitreous cavity. OVD can be washed from the anterior chamber with the irrigation aspiration cannula and cleared from behind the IOL with the vitrector[1].

Please follow the link or QR code for the surgery video of anterior vitrectomy after the PCIOL implantation following posterior capsule rupture HD on the YouTube. https://www.youtube.com/watch?v=vw0vTE6S6kY

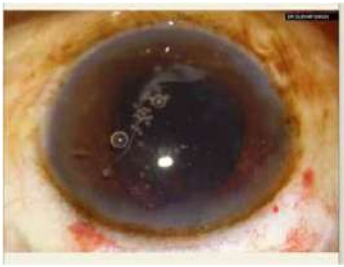


Protocol for a large posterior capsule rupture

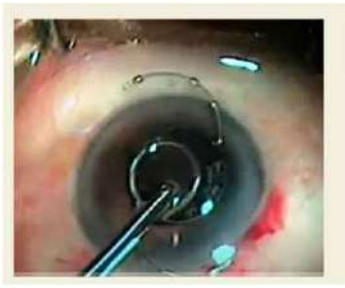
After a large posterior capsular rupture, the best approach is to implant the IOL in the sulcus. First, the sulcus should be filled with a dispersive OVD around 360º. To do this, the anterior capsule is first identified, then OVD is injected from the center to the periphery over the anterior surface of the anterior capsule. This ensures proper filling of the sulcus[1].

I prefer rigid PMMA IOLs in these situations, and this requires enlargement of the corneal incision to accommodate the IOL The IOL can then be inserted through the main incision, with the leading haptic directed toward the sulcus opposite from the entry incision and the trailing haptic resting on the anterior surface of the iris. After ensuring that the leading haptic is placed over the anterior surface of the anterior capsule, the IOL can be dialed into the sulcus; the IOL should not be tilted after dialing. Foldable IOLs can also be implanted in the sulcus. The leading haptic is directed toward the sulcus, the optic unfolds at the pupillary plane, and the trailing haptic is placed over the anterior surface of the iris. Before the IOL is dialed into the sulcus, the leading haptic should be well positioned in the sulcus. The OVD is washed thoroughly from the anterior and posterior chambers and behind the IOL with the help of the I/A cannula and vitreous cutter). Complete removal of OVD is mandatory to avoid development of complications such as severe inflammatory reaction, hazy media, exudative membranes, secondary glaucoma, and cystoid macular edema. Intracameral miotic agents such as carbachol or pilocarpine can be used to constrict the pupil and prevent IOL destabilization after implantation. Any peaking of the pupil after constriction indicates that vitreous is incarcerated in that region. It should be immediately cleared with the vitreous cutter. The anterior chamber is formed with balanced saline solution, with or without air, and the main and side port incisions are sealed with hydration. I prefer to use 10-0 sutures for the main and side port incisions, as vitrectomized eyes are prone to hypotony[1].

Please follow the link or QR code for the surgery video Anterior Vitrectomy with implantation of the PMMA IOL in the sulcus on the YouTube https://www.youtube.com/watch?v=ZPAJseMziYg



Please follow the link or QR code for the surgery video of the implantation of the PMMA IOL in the sulcus on the YouTube https://www.youtube.com/watch?v=Nvv3q4JSyD0



Protocol after posterior capsular rupture with nucleus fragments dropped into the vitreous cavity.

After PCR, sometimes the nucleus or nuclear fragments drop into the vitreous cavity. Management should be executed as discussed previously. If a vitreoretinal surgeon is available, the case should be transferred immediately for management. Otherwise, anterior vitrectomy is done, passing the vitreous cutter through the PCR and performing core vitrectomy under direct visualization. The IOL can be implanted in the capsular bag or sulcus, according to the size and extent of the PCR. The patient must then be referred to a vitreoretinal center for management. Protocol after zonular dehiscence. Small zonular defects (up to 3 clock hours) can be treated using a capsular tension ring; however, large defects require suture fixation of the capsular bag to the scleral wall.

References

1. Singh,S.IOL ImplantationAfter PCR.Cataract & Refractive Surgery Today Europe.April 2014;55-58 http://crstodayeurope.com/wpcontent/themes/crste/assets/downloads/0414CRSTEuro_Singh_F3.pdf

2. Vasavada A.R., Singh R. Phacoemulsification with posterior polar cataract. J Cataract Refract Surg. 1999;25:238245. [PubMed] [Google Scholar]
3. Osher R.H., Yu B.C., Koch D.D. Posterior polar cataracts: a predisposition to intraoperative posterior capsular rupture. J Cataract Refract Surg. 1990;16:157162. [PubMed] [Google Scholar]
4. Fine I.H., Packer M., Hoffman R.S. Management of posterior polar cataract. J Cataract Refract Surg. 2003;29:1619. [PubMed] [Google Scholar]

Published by
Dr Sudhir Singh
M.S(Ophthalmology)
Fellow American Academy of Ophthalmology
Rotary Club Host Program
International Ophthalmic Heroes of India 2020 Awardee
Ambassador, Eye Foundation of America
Formerly Editor Journal, Rajasthan Ophthalmological Society
Sr Consultant & Head (Ophthalmology)
Global Hospital & Research Centre Mount Abu, India 307501
Websites Editor in Chief www.SquintMaster.Com
YouTube Channels
SquintMasterIndia
Twitter https://twitter.com/resp2020
http://www.squintmaster.com/
http://sudhir.info/
Visit Us for more
on strabismus software at www.SquintMaster.Com

Legends for the images

Image 1
Pre operative and post operative day 1 vision 6/9 undaided and 6/6 corrected follwing 6 mm manual small incision cataract surgery
Please follow the link or QR code for the surgery video of the manual small incision cataract surgery on the YouTube
https://www.youtube.com/watch?v=2ICFx-Y2eAc

Image 2
Please follow the link or QR code for the surgery video of the manual small incision cataract surgery on the YouTube
https://www.youtube.com/watch?v=2ICFx-Y2eAc

Image 3
Please follow the link or QR code for the surgery video of phacoemulsification In the Posterior Polar Cataract on the YouTube https://www.youtube.com/ watch?v=62v78L4SoWU

Image 4
Please follow the link or QR code for the surgery video of phacoemulsification In the Posterior Polar Cataract on the YouTube https://www.youtube.com/watch?v=1wRRv5dPiDo&t=7s

Image 5
Please follow the link or QR code for the surgery video of the bimanual anterior vitrectomy HDon the YouTube https://www.youtube.com/watch?v=GtlRZjAsIgA

Image 6
Please follow the link or QR code for the surgery video of anterior vitrectomy after the PCIOL implantation following posterior capsule rupture HD on the YouTube. https://www.youtube.com/watch?v=vw0vTE6S6kY

Image 7
Please follow the link or QR code for the surgery video Anterior Vitrectomy with implantation of the PMMA IOL in the sulcus on the YouTube

Image 8
Please follow the link or QR code for the surgery video of the implantation of the PMMA IOL in the sulcus on the YouTube
https://www.youtube.com/watch?v=Nvv3q4JSyD0

"Stop and Think - Pentacam versus Sirius The Scheimpflug imaging systems"

Dr Ayushi Gupta[1], Dr Rakesh Porwal[1]
1. Department of Ophthalmology, J.L.N Medical College and Hospital, Ajmer, Rajasthan

Abstract

Purpose This study aims to evaluate the measurements of the corneal tomography by two Scheimpflug-based devices the Pentacam HR and the Sirius CSO and to assess the interdevice variability in 3 groups of study subjects prediagnosed Keratoconus (KCN), Forme fruste keratoconus(FFKCN) and subjects with ≥2 D of Astigmatism . Patients and Methods Patients were recruited prospectively and divided into 3 groups of 20 eyes each. Measurements with the Oculus Pentacam and Sirius CSO were performed. For every eye, the following parameters were analysed statistically K1 (flattest keratometric reading - anterior), K2 (steepest meridian anterior), Kmax, thinnest pachymetry, pachymetry at apex, highest front and back elevation. Result- 60 eyes from individuals aged 08-40 years were evaluated. Group 1 had 20 eyes, including 8 males and 8 females with clinically prediagnosed keratoconus; Group 2 had 20 eyes, including 10 males and 10 females with diagnosed FFKCN; Group 3 had 20 eyes, including 10 males and 8 females with ≥2 D astigmatism. The mean K1 difference between the measurements of Pentacam and Sirius was 1.02 ± 1.53 in KCN group, 1.63± 1.36 in FFKCN group and 0.86 ± 1.02 in group with ≥2D astigmatism. The mean K2 difference between the measurements of Pentacam and Sirius was 0.75 ± 2.38 in KCN group, 1.35 ± 1.92 in FFKCN group and 0.6 ± 1.53 in group with ≥2D astigmatism. The mean Kmax difference between the measurements of Pentacam and Sirius was 0.56 ± 1.02 in KCN group, 0.36 ± 2.19 in FFKCN group and 0.52 ± 1.06 in group with ≥2D astigmatism. The mean thinnest pachymetry difference between the measurements of Pentacam and Sirius was 5.44 ± 11.42 in KCN group, 2.21 ± 12.96 in FFKCN group and 4.6 ± 11.14 in group with ≥2D astigmatism. The mean apex pachymetry difference between the measurements of Pentacam and Sirius was 1.26 ± 14.11 in KCN group, 1.99 ± 13.41 in FFKCN group and 4.79 ± 14.43 in group with ≥2D astigmatism. The mean Anterior and Posterior elevation difference between the measurements of Pentacam and Sirius was 5.01 ± 10.34 , 2.31 ± 21.43, respectively in Group 1,0.81 ± 11.43, 1.85 ± 19.32 respectively in Group 2 and 0.47 ± 11.88, 0.67 ± 21.32 respectively in Group 3.The difference was statistically significant. Conclusion All the measurements between both the imaging modalities showed a significant positive correlation. Sirius produces keratometry readings higher than pentacam in KCN and FFKCN group and comparable readings in group with Astigmatism. Corneal thickness, Front and back elevation were higher in Pentacam than Sirius measurements in patients with KCN and FFKCN and almost comparable in subjects with only astigmatism. These tomographic systems could not be used interchangeably in clinical diagnosis and follow-up. A 9-year-old male child, resident of dist. Jodhpur Rajasthan presented to the eye department of MDM hospital on 24th October with a history of trauma to left eye with Rooster's spur seven days back. There was retained spur of Indian Rooster in anterior chamber at 6'oclock position with mild corneal edema and anterior chamber reaction grade lll, and vision of the patient was up to 6/18 at the time of presentation. The patient consulted Community Health Centre 5 days back, where empirical antibiotics and antifungal drops were given, and patient was referred to MDM Hospital DR.SN medical college jodhpur Rajasthan. Patient was admitted on 24th October and viral markers blood sugar and other relevant pre-op investigations were done which turned out to be normal. X-ray orbit and B-scan were done to rule out posterior segment FB. Anterior Segment-Optical coherence tomography showed shadowing of corneal layers corresponding to the location of FB. It suggested that FB penetrated the full thickness of cornea and extended into the AC. After obtaining informed consent, the patient was taken up

Introduction

Keratoconus (KCN) is the most common progressive asymmetric, bilateral, corneal ectatic disorder that arises due to biomechanical and structural defects in corneal collagen organization(1), which leads to irregular astigmatism and decreased visual function. Early detection of FFKCN and KCN is performed by corneal tomography, clinical and bio-microscopic examination.

The reduced visual quality leads many patients with KCN to present at refractive surgery centres for alleviation of their symptoms by LASIK(2). KCN and FFKCN are contraindications for LASIK because of the high risk of postoperative ectasia(2,3). Early detection may lead to early intervention and prevent any refractive surprises.

The imaging mechanism in both tomographic devices is different so that the HR Pentacam(Oculus Optikgeräte GmbH, Wetzlar,

Germany) uses a rotating scheimpflug camera, and the Sirius tomography system (Costruzioni Strumenti Oftalmici, Florence, Italy) combines two mechanisms of the scheimpflug rotating camera with Placido disk topography to image the anterior segment of the eye.

Scheimpflug principle states that in order to get a higher depth of focus, the picture plane, the objective plane, and the film plane should be moved in such a way that they cut each other in one line or one point of intersection, known as the Scheimpflug intersection. For a detailed analysis of the cornea, up to 100 scheimpflug images can be captured with the HR Pentacam during the rotating scan, while the 25 scheimpflug images and 1 Placido disc image captured using the Sirius. Sirius Scheimpflug analyzer is based on Placido disc and a mono rotating Scheimpflug system for corneal photography. The machine has 22 Placido rings which enhance anterior surface measurements, analyses>100 000 points, and cover 12mm zone of cornea(4). Around 25 Scheimpflug images and 1 Placido disc image are acquired in less than 1 sec. The Sirius captures 21632 elevation points on front surface and 16000 on the posterior surface.

Patients and Methods

Patients in the age group of 8 to 40 years who presented with pre diagnosed keratoconus or FFKCN and astigmatism ≥2 D at the Out Patient Department of the department of Ophthalmology JLN hospital Ajmer were recruited prospectively.
Inclusion criteria were the presence of Keratoconus and Forme fruste keratoconus diagnosed according to Amsler Krumeich and Belin ABCD classification system and astigmatism ≥2D. Patients with a history of previous ocular injury, previous ocular surgery, other corneal diseases, and other ectatic diseases like Pellucid Marginal Degeneration were excluded.

Measurement System

To detect the differences between the two devices, we included 60 eyes in the age group of 08- 40 years. Group 1 had 20 eyes, including 8 males and 8 females with clinically prediagnosed keratoconus; Group 2 had 20 eyes, including 10 males and 10 females with diagnosed FFKCN; Group 3 had 20 eyes, including 10 males and 8 females with ≥2 D astigmatism. Measurements were first performed using the Pentacam HR (Oculus OptikgerateGmbH, Wetzlar, Germany). The subject was asked to place his/her chin on the chin rest and the forehead against the headrest. The subject was asked to open both eyes and look at the fixation target. The examiner aligned the joystick until the rotating Scheimpflug camera automatically captures 25 single images within 2 seconds for each eye. After 15-20 min of rest, a measurement was made using the Sirius system. Following parameters were assessed for every eye, K1, K2, anterior mean K, anterior Kmax, pachymetry at the thinnest location, pachymetry at the apex, the highest anterior corneal elevation and the highest posterior corneal elevation in the 3-mm pupillary area. Statistical analysis: Data was represented in the form of tables and analysed with the help of descriptive statistics. The data was coded and entered into Microsoft Excel spreadsheet. Analysis was done using SPSS version 20 (IBM SPSS Statistics Inc., Chicago, Illinois, USA) Windows software program. The variables were assessed using unpaired "t" test. Descriptive statistics included computation of percentages, means and standard deviations. Level of significance was set at $P \leq 0.05$.

Results

All the measurements between both the imaging modalities showed a significant positive correlation. Sirius produces keratometry readings higher than pentacam in KCN and FFKCN group and comparable readings in group with astigmatism. Corneal thickness, Front and back elevation were higher in Pentacam than Sirius measurements in group with KCN and FFKCN and almost comparable in group with only astigmatism. These tomographic systems could not be used interchangeably in clinical diagnosis and follow-up. The measurements with Sirius and Pentacam were done with different types of software, so the different algorithms used by the manufacturers lead to different results for the evaluation procedure. For the Pachymetry maps, Pentacam uses the Cartesian Coordinate System whereas Sirius uses the Polar Coordinates System . For the Elevation maps, pentacam uses best fit sphere (bfs) as reference surface whereas sirius uses best fit toric aspheric as a reference surface.

Table 1: Scheimpflug camera data obtained in both devices in Group 1 (n=20)

Measured Mean values	PENTACAM	SIRIUS	MEAN DIFFERENCE
K1 (3 mm)	47.78 ± 5.36	48.8 ± 4.76	1.02 ± 1.53
K2 (3 mm)	52.37 ± 4.81	53.12 ± 4.88	0.75 ± 2.38
Kmax	58.49 ± 5.62	59.05 ± 5.11	0.56 ± 1.02
Apex Pachymetry (µm)	465.78 ± 74.41	464.52 ± 70.87	1.26 ± 14.11
Thinnest Pachymetry (µm)	440.72 ± 47.36	425.28 ± 40.67	5.44 ± 11.42
Anterior elevation	24.82 ± 9.44	19.81 ± 9.25	5.01 ± 10.34
Posterior elevation	40.81 ± 12.95	38.5 ± 28.88	2.31 ± 21.43

Table 2: Scheimpflug camera data obtained in both devices in Group 2 (n=20)

Measured Mean values	PENTACAM	SIRIUS	MEAN DIFFERENCE
K1 (3 mm)	44.19 ± 5.92	45.82 ± 7.64	1.63 ± 1.36
K2 (3 mm)	46.24 ± 5.41	47.59 ± 4.82	1.35 ± 1.92
Kmax	48.62 ± 4.26	48.98 ± 5.62	0.36 ± 2.19
Apex Pachymetry (µm)	495.71 ± 23.92	493.72 ± 27.81	1.99 ± 13.41
Thinnest Pachymetry (µm)	490.69 ± 22.77	488.48 ± 35.63	2.21 ± 12.96
Anterior elevation	17.28 ± 8.14	16.47 ± 7.28	0.81 ± 11.43
Posterior elevation	25.18 ± 14.81	23.33 ±15.79	1.85 ± 19.32

Table 3: Scheimpflug camera data obtained in both devices in Group 3 (n=20)

Measured Mean values	PENTACAM	SIRIUS	MEAN DIFFERENCE
K1 (3 mm)	44.02 ±6.31	44.88 ± 5.72	0.86 ± 1.02
K2 (3 mm)	45.48 ± 5.72	46.08 ± 6.36	0.6 ± 1.53
Kmax	45.73 ± 3.62	46.25 ± 4.92	0.52 ± 1.06
Apex Pachymetry (µm)	561.45 ± 37.40	556.66 ± 45.26	4.79 ± 14.43
Thinnest Pachymetry (µm)	555.48 ± 34.50	550.88 ± 33.45	4.6 ± 11.14
Anterior elevation	11.28 ± 4.94	10.81 ± 8.52	0.47 ± 11.88
Posterior elevation	15.18 ± 15.92	14.51 ± 19.85	0.67 ± 21.32

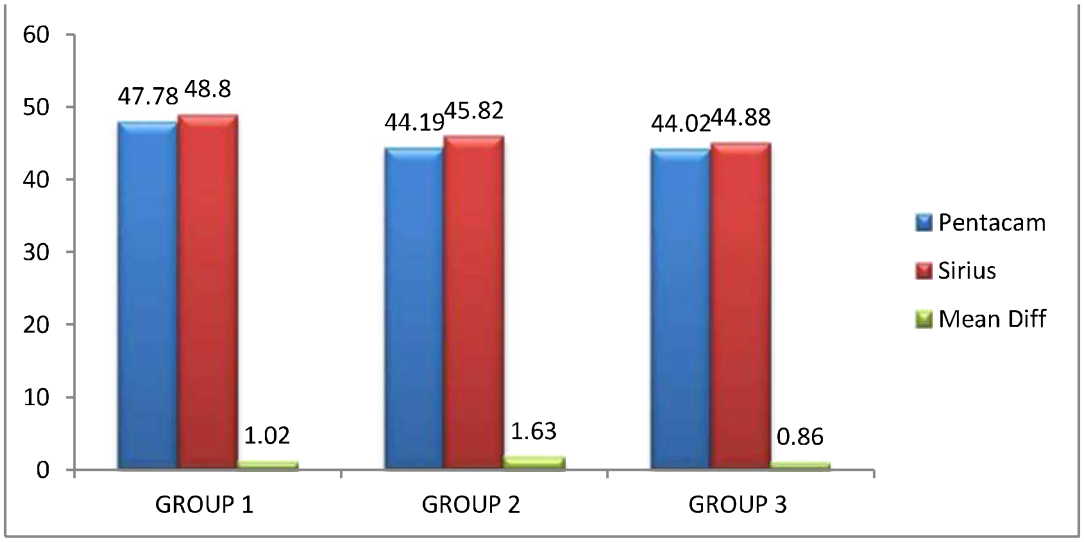


Fig 1: Measured mean values of the flattest keratometric reading – anterior (K1) in 3 groups

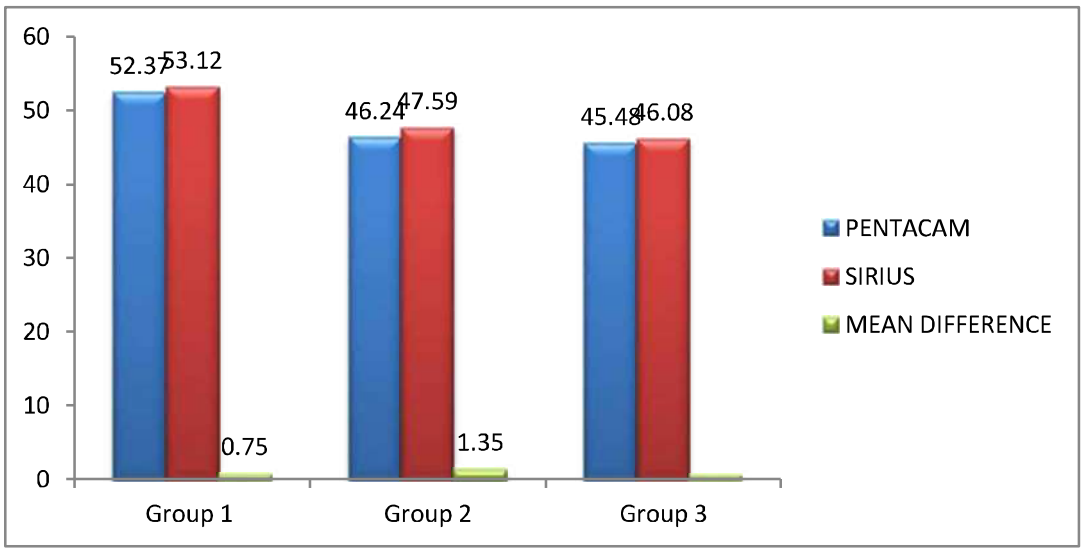


Fig 2: Measured mean values of the Steepest Keratometric readings (K2) in 3 Groups

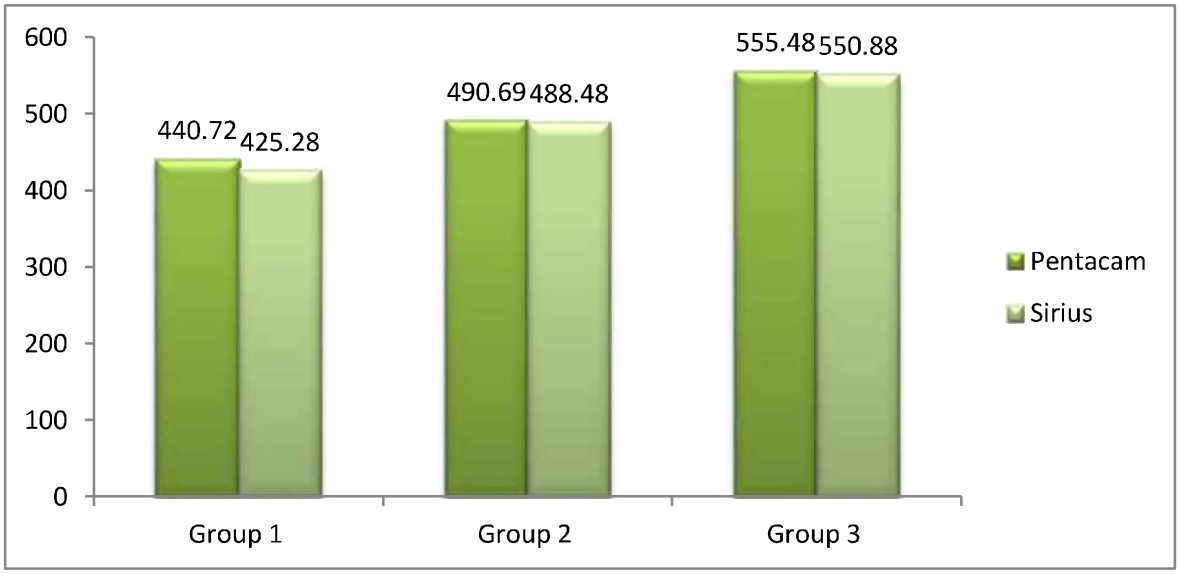


Fig 3: Mean Thinnest Pachymetry in Pentacam and Sirius in 3 Groups

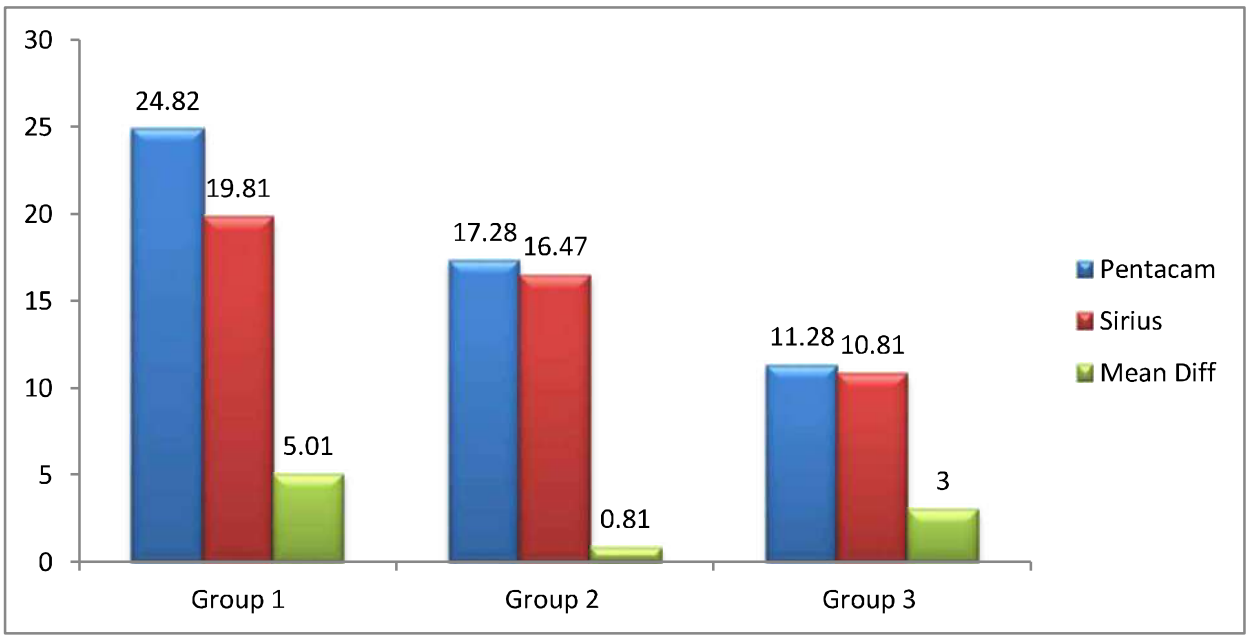


Fig 4: Measured mean Anterior elevation in Pentacam and Sirius in 3 Groups

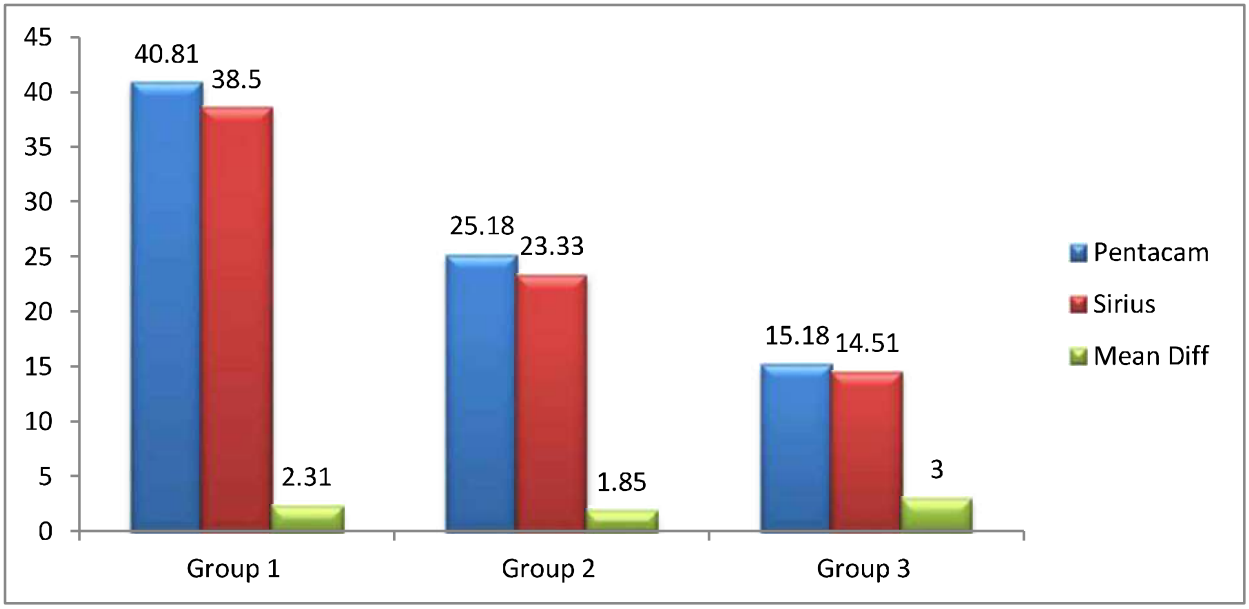


Fig 5: Measured Mean Posterior Elevation in Pentacam and Sirius in 3 Groups

Discussion

CORNEAL TOPOGRAPHY is the representation of geometrical properties of cornea, which includes only the anterior corneal surface.

CORNEAL TOMOGRAPHY is the three dimensional characterisation of the entire cornea which includes anterior as well as posterior corneal surface.

PENTACAM	SIRIUS
Based on Scheimpflug camera imaging	Based on combinations of Placido rings and Scheimpflug camera imaging Allows more accurate detection of anterior surface parameters because of placido incorporation with scheimpflug camera
Obtains corneal thickness from 8-10mm of cornea	Obtains full corneal thickness
Gives detailed BELIN AMBROSIO ENHANCED ECTASIA DISPLAY for easy detection of keratoconus . Also gives special thickness profile unique to pentacam	Employs an internal algorithm for classification into normal , suspect , abnormal or keratoconus compatible
Reference surface – Best Fit Sphere	Best Fit Toric Asphere
Measures elevation from reference surface	Measures Δz : point by point difference along
Recommended cut off values published	the z axis Δz : No recommended cut off values
True elevation	Not true elevation
GULLSTRAND RATIO Ratio of radius of curvature of back to front NORMAL - 83% or 0.83	Ratio of radius of curvature of Ant to post NORMAL - 1.18 -1.22

The discrepancy between the measurements of the Pentacam and Sirius tomographic systems may be due to

A-Both Scheimpflug-based tomography systems use different accuracy standards for measuring relevant parameters.

B-The imaging mechanism in both tomographic devices is different- the HR Pentacam (Oculus Optikgeräte GmbH, Wetzlar, Germany) uses a rotating scheimpflug camera, and the Sirius tomography system (Costruzioni Strumenti Oftalmici, Florence, Italy) combines two mechanisms of the scheimpflug rotating camera with Placido disk topography to image the anterior segment of the eye.

C-Sirius and Pentacam use different types of software, so the different algorithms used by the manufacturers lead to different results for the evaluation procedure.

D-The elevation points evaluated in these two systems also differ from each other.

E-For a detailed analysis of the cornea, up to 100 scheimpflug images can be captured with the HR Pentacam during the rotating scan, while 25 scheimpflug images and 1 Placido disc image can be captured using the Sirius. These tomographic systems could not be used interchangeably in clinical diagnosis and follow-up.

References

1. Mukhtar S, Ambati BK. Pediatric keratoconus: a review of the literature. Int Ophthalmol. 2018;38(5):22572266.

2. Krachmer JH, Feder RS, Belin MW. Keratoconus and related noninflammatory corneal thinning disorders. Surv Ophthalmol 1984; 28:293322.

3. Alaa A. Gaith, Amr A. El kheir, Mohamed W. Elkateb, Sally F. Elseheimy Evaluation of two scheimpflug camera-based devices in the analysis of keratoconus The Egyptian Journal of Cataract and Refractive Surgery 2017, 23:2328

4. Jigyasa Sahu Corneal Topography: Sirius Delhi J Ophthalmology Vol. 32, No. 2, October-December 2021

"Role of freeze-dried amniotic membrane in management of persistent epithelial defect on dry eye disease"

Dr. Shweta Meena[1], Dr. Arvind Chauha[1], Major Vikas Sharma[2]
1. Department of Ophthalmology SNMC, Jodhpur
2. Military Hospital, Jodhpur

Abstract

Purpose: To report the outcome of freeze-dried amniotic membrane for persistent epithelial defects (PED) in moderate to severe cases of dry eye disease. Methodology: This retrospective-prospective observational study included consecutive patients of dry eye disease with PED treated with freeze dried amniotic membrane and bandage contact lens. Included were patients with an epithelial defect that did not respond to conventional treatment. Excluded were the patients who failed to follow up. Results: 30 eyes of 30 patients with mean age of 38.8 years (21-58 years) were included in this study. The main etiology of PED was superficial punctate keratitis (n=7/30), followed by chemical burns (n=4/30), limbal stem cell deficiency (n=4/30), and neurotrophic keratitis (n=3/30). The remaining cases were exposure keratitis, vernal keratitis, filamentary keratitis, GVHD, simple herpetic keratitis (n=2/30) respectively, Sjogren's syndrome (n=1/30), herpes zoster keratitis (n=1/30). Time from PED presentation to amnion treatment was 39.1 days (range 16-90 days). The amnion was absorbed within 2 weeks in 100% of the cases. Following insertion of the amnion, resolution of the PED was achieved in 26/30 eyes (86.6%) without the need for additional interventions within 20.7 days (range 7-35 days) with no complications recorded. Conclusion: Dried amniotic membrane achieved resolution of PEDs secondary to various etiologies of dry eye disease in 86.6% of eyes, with a significant improvement in vision demonstrated. Further studies are needed to assess long-term safety and effectiveness.

Introduction

The corneal epithelium serves as a protective barrier against infections and maintains a smooth optical surface. 1 If the epithelium is damaged, it can lead to corneal erosion, which increases the risk of infection and can impair vision. Normally, the epithelium undergoes a repair process that involves various factors such as growth regulation, cellular signaling, proliferation, migration, and remodeling of the extracellular matrix. However, when corneal epithelial defects persist for more than 10-14 days despite standard treatment, it is known as Persistent Corneal Epithelial Defects (PEDs). Possible causes of PEDs include faulty epithelial adhesion, deficiencies in limbal stem cells, inflammation, neurotrophic components, and idiopathic or hereditary disorders.

1. Management of persistent corneal epithelial defects (PEDs) involves a step-by-step approach that depends on the underlying cause. Various non-surgical treatments are available, such as optimizing the ocular surface, using bandage contact lenses, employing blood-derived products like autologous serum and platelet-rich plasma, punctal plugs, scleral contact lenses, and cenegermin. 2 If non-surgical methods are not effective, surgical options can be considered, including epithelial debridement, amniotic membrane transplant (AMT), and corneal stem cell transplant. 4 Amniotic membranes are known to contain numerous growth factors that facilitate wound healing, provide a scaffold for re-epithelialization, and possess anti-inflammatory properties. 5 As a result, they have been proven to be effective in the treatment of PEDs. 6,7 Commercially available amniotic membrane implantation such as the cryopreserved ProKera has shown promising results in treating bacterial keratitis, alkali burns, 9 partial limbal stem cell deficiency, 10 acute toxic epidermal necrolysis, 11 and PEDs. 12 Freeze and vacuum dehydrated amnion tissue are also recently introduced, which can be easily stored and transported at room temperature. 13 This study is the first to evaluate the efficacy of suture less dehydrated amniotic membrane treatment for PEDs in Western Rajasthan, India.

Methods

Source of data - A hospital-based retrospective-prospective observational study (mixed design cohort study) to evaluate the role of freeze-dried amniotic membrane in reducing signs and symptoms of DED associated with ocular surface involvement. The study will be conducted for a period of five months, from June 2022- November 2022, in the department of Ophthalmology, Dr. S. N Medical College, Mathura Das Mathur

Hospital, with due permission from the Institutional Ethical Committee and Review Board after taking written informed consent from the patient. The study included patients who did not experience sufficient resolution of the defect following ocular surface optimization and treatment with a BCL, as per the Global Consensus guidelines for managing Limbal Stem Cell Deficiency. This optimization process addressed any underlying comorbidities of the eyelid and conjunctiva, reduced toxicity from topical medications, lowered inflammation through various medications, improved tear function with preservative-free artificial tears and/or autologous serum, and treated underlying meibomian gland dysfunction. Patients with less than three months of follow-up were excluded from the study.

Data collection:Prior to surgery, demographic information such as gender, age, and laterality was recorded. Other baseline data collected included best-corrected visual acuity (BCVA), the cause of the persistent epithelial defect (PED), any systemic
comorbidities, the size of the PED measured in square millimeters with fluorescein staining and cobalt flue filter, the duration between PED presentation and amnion treatment, the time it took for the PED to resolve after amnion treatment, follow-up time, and BCVA after resolution. Recurrences of the PED, any complications, or adverse events that occurred during the follow-up period were also documented.

Amniotic membrane :- Amniocare-D, a dehydrated amniotic membrane that does not require sutures, was stored at room temperature before use. Patients were given proparacaine hydrochloride 0.5% eye drops, and after five minutes, a lid speculum was inserted, and cellulose sponges were used to dry the cornea. In our experience, proper adhesion of the amniotic membrane to the corneal surface requires the corneal surface to be dry. A 9.0 mm circular amniotic membrane disc was placed over the center of the cornea to cover the entire epithelial defect. However, care should be taken to prevent the amnion from folding on itself, which can be achieved by using a second non-toothed curved forceps to smooth it onto the corneal surface immediately after placement. After 2 to 5 minutes, a sterile BCL was placed over the amnion and dried with cellulose eye sponges. Adequate positioning of the amnion and BCL was confirmed at the slit lamp 5 minutes later. Patient follow-up: - Patients were monitored every 1-3 weeks after the insertion of the amniotic membrane until the epithelial defect was resolved. During each visit, the area of the PED and BCVA were documented. If the PED showed adequate but incomplete resolution after the absorption of the amniotic membrane, the BCL treatment was continued.

Study outcome : - The main objectives of the study were to assess the rate and duration of PED resolution, as well as any changes in BCVA and incidence of serious adverse events.

Results

30 eyes of 30 patients with mean age of 38.8 years (range 21-58 years) were included in this study, of which 23.33% (n=7) were of female gender and 76.67% (n=23) were males. The mean follow-up time of 45.66 days (range 21-89 days).

PED etiologies: - The main etiology of PED was superficial punctate keratitis (n=7/30), followed by chemical burns (n=4/30) and limbal stem cell deficiency (n=4/30), neurotrophic keratitis (n=3/30). The remaining cases were exposure keratitis, vernal keratitis, filamentary keratitis, GVHD, simple herpetic keratitis (n=2/30) respectively, Sjogren's syndrome (n=1/30), herpes zoster keratitis (n=1/30). PED duration: - Time from PED presentation to amnion treatment was 39.1 days (range 16-90 days), with the area of the PED being 9.48 mm2 (range 1-30 mm2). The amnion was absorbed within 2 weeks in 100% of the cases. Following insertion of the amnion, resolution of the PED was achieved in 26/30 eyes (86.6%) without the need for additional interventions within 20.7 days (range 7-35 days) with no complications recorded.

Complications and adverse events :-No issues occurred during the amniotic membrane placement or during subsequent follow-up. None of the patients complained of discomfort with the application of amnion and BCL on their ocular surface. There were no instances of PEDs recurring during the follow-up period.

Figure 1 :
Dry amniotic graft with bandage contact lens-

Pre-operative image of PED Intra-operative image before dry AMG

Intra-op image after AMG

Healed epithelial defect after 21 days

Discussion

This study is an observational analysis of the effects of dehydrated amniotic membrane transplantation on persistent epithelial defects (PEDs) in dry eye disease patients who have not responded to traditional treatments. In our study, we observed complete resolution of PEDs in 26 out of 30 eyes (86.66%) for various reasons, although incomplete recovery was observed in three cases, and one case of epithelial disorder in dry eye disease did not improve. The severity and persistence of multiple corneal erosions prevented complete healing in these cases. 73% of participants in our study showed significant improvement in corneal transparency, which is associated with improved visual acuity, emphasizing the healing properties of amniotic membrane grafts.

Previous studies on the effects of ProKera, 12 a type of amniotic membrane graft, have reported varying success rates and complications, including eye pain and headaches. The current study evaluated the use of dry amniotic membrane (Amniocare-D), a readily available amnion graft, for PEDs and reported an 86.66% resolution rate without any reports of pain or discomfort. Use of a bandage contact lens to secure the graft and the absence of a conformer ring may have improved patient comfort. The Amniocare-D was fully absorbed after a few weeks, which may make it a more appropriate option for monocular patients. The study also observed an improvement in best-corrected visual acuity postoperatively, likely due to the resolution of PEDs that involved the visual axis.

In a 2021 study by Michael Mimouni, Tanya Trinh, Nir Sorkin et al., BioDOPTIX amnion graft was used to treat patients with PED resulting from specific causes. After an average of 17.8 days, 89% of eyes achieved resolution of PEDs without any patient experiencing discomfort from the graft. There was also improvement in LogMAR BCVA from 0.94+ 0.88 to 0.37+0.25 (p=0.036). These findings were consistent with previous studies and our own study.

Another retrospective study by M McDonald et al. showed that self-retained CAM (cryopreserved amniotic membrane) could accelerate the recovery of corneal surface health in patients with mild and severe dry eye disease. A single placement of CAM for 5.4+2.8 days led to a significant improvement in DED symptoms and signs, with an overall significant reduction in DEWS scoring from 3.25+0.5 (baseline) to 1.44+0.6 at 1 week, 1.45+0.6 at 1 month, and 1.47+0.6 at three months. These findings were consistent with previous studies and our own study as well. To sum up, the study demonstrates the efficacy of using dried amniotic membranes for treating different ocular surface disorders, especially persistent epithelial defects. The results indicate that dry amniotic

membrane implantation is a safe, simple, convenient, and successful treatment for moderate to severe dry eye disease with multiple epithelial defects.

Declaration of conflicting interests :- The author declared no conflicts of interest with respect to the research, authorship, and/or publication of the article.

References

1. Eghrari AO, Riazuddin SA and Gottsch JD. Overview of the cornea: structure, function, and development. Prog Mol Biol Transl Sci 2015; 134: 723.

2. Ljubimov AV and Saghizadeh M. Progress in corneal wound healing. Prog Retin Eye Res 2015; 49: 1745.

3. Vajpayee RB, Mukerji N, Tandon R, et al. Evaluation of umbilical cord serum therapy for persistent corneal epithelial defects. Br J Ophthalmol 2003; 87(11): 13121316.

4. Katzman LR and Jeng BH. Management strategies for persistent epithelial defects of the cornea. Saudi J Ophthalmol 2014; 28(3): 168172.

5. Azuara-Blanco A, Pillai CT and Dua HS. Amniotic membrane transplantation for ocular surface reconstruction. Br J Ophthalmol 1999; 83(4): 399402.

6. Raj A, Dhillon H and Bahadur H. A comparative study of tarsorrhaphy and amniotic membrane transplantation in the healing of persistent corneal epithelial defects. Indian J Ophthalmol 2020; 68(1): 2933.

7. Dekaris I, Mravicic I, Barisic A, et al. Amniotic membrane transplantation in the treatment of persistent epithelial defect on the corneal graft. Coll Antropol 2010; 34(Suppl 2): 1519.

8. Sheha H, Liang L, Li J, et al. Sutureless amniotic membrane transplantation for severe bacterial keratitis. Cornea 2009; 28(10): 11181123.

9. Kheirkhah A. Temporary sutureless amniotic membrane patch for acute alkaline burns. Arch Ophthalmol 2008; 126(8): 10591066.

10. Kheirkhah A, Casas V, Raju VK, et al. Sutureless amniotic membrane transplantation for partial limbal stem cell deficiency. Am J Ophthalmol 2008; 145(5): 787794.

11. Shay E, Khadem JJ and Tseng SCG. Efficacy and limitation of sutureless amniotic membrane transplantation for acute toxic epidermal necrolysis. Cornea 2010; 29(3): 359361.

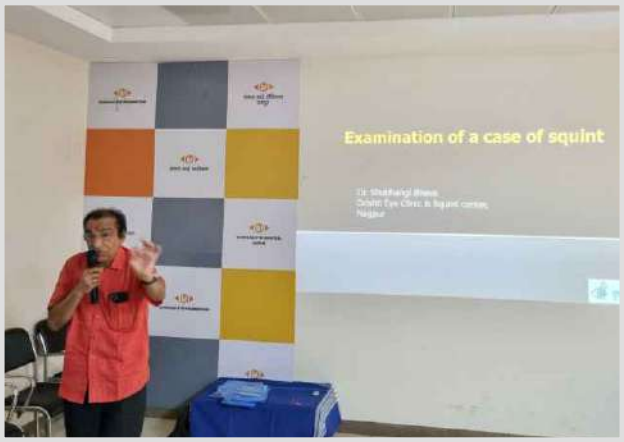
12. Pachigolla G, Prasher P, Di Pascuale MA, et al. Evaluation of the role of ProKera in the management of ocular surface and orbital disorders. Eye Contact Lens 2009; 35(4): 172175.

13. Dua HS, Said DG, Messmer EM, et al. Neurotrophic keratopathy. Prog Retin Eye Res 2018; 66: 107131.

ROSCON KOTA-2022

Scientific session

ROSCON Mid term & PG Teaching



"Early Death Among Doctors" How to Reverse this Trend?

Dr. Suresh K. Pandey
MBBS, MS (Ophthalmology, PGIMER, Chandigarh)
Ant. Segment Fellowship (USA & Australia)
President-Kota,Divi.Ophthalmological Society(KDOS)
V-President, Indian Medical Association (IMA)KOTA
Director, SuVi Eye Institute & Lasik Laser Center
C 13 TALWANDI, KOTA, RAJ. 324 005, INDIA
Email:suresh.pandey@gmail.com
Website: www.suvieyehospital.com
www.drsureshpandey.com

Dr. Vidushi Sharma
MBBS, MD (AIIMS, New Delhi), FRCS (UK)
Oculoplastic Surgery Fellowship (Australia)
Author : Meri Kitab Meri Dost : A Motivational Book for Youth
Director, SuVi Eye Institute & Lasik Laser Center
C 13 TALWANDI, KOTA, RAJ. 324 005, INDIA

Corresponding Author: Dr. Suresh K. Pandey, (MBBS, MS (Ophthalmology, PGIMER, Chandigarh) Director, SuVi Eye Institute & Lasik Laser Center, C 13 Talwandi, SuVi Eye Hospital Road, Kota, Rajasthan, India, E-mail:suvieye@gmail.com

During the past few years, the sudden death of young ophthalmologists in India shocked the entire ophthalmic fraternity. Recently, the sudden demise of Kolkata-based ophthalmologist due to massive myocardial infarction came as shocking, sad news for ophthalmic colleagues. Similarly, few young, highly skilled, and talented eye surgeons from NABHA, Punjab, Jhunjhunu, Rajasthan, and a few others, succumbed before the age of 45-50 years. Sudden early deaths have frequently been reported among medical professionals during the past few years.[1-3] This indicates an alarming trend of the sudden death of doctors and is also closely associated with stress/burnout, a sedentary lifestyle, long working hours, and socio-economic factors.

Sudden deaths among medical professionals?

One of the most important reasons is overwork, stress, lack of physical activity, and lack of regular health checkups. Young and middle-aged doctors are in a critical period of their family and professional career development. Not only do they hope to make breakthroughs in clinical services as well as academic research, but they also face pressure from patients and their families. The escalation of contradictions between doctors and patients has also become an increasing mental burden in the practice of many medical professionals.

Middle-aged doctors have heavy familial responsibilities, such as paying the bank loan for medical/ophthalmic practice, supporting parents, rearing children, and making mortgage payments, which cause them to work harder (six to seven days a week) without any breaks. Deteriorated working environment, serious violence against doctors, and decreased patient physician trust also intensified the sense of "stress/burnout" in doctors. Male medical professionals, especially in a surgical specialty and operative care, have larger overloads and longer working hours, which may be the primary cause of death. Besides, incorrect stress relief manners also affect doctors' heaths, such as excessive alcohol consumption, smoking, and long-term energy drink consumption. Lack of exercise and obesity also increase the risk of acute myocardial infarction and stroke. Medical professionals usually neglect regular medical checkups themselves, which results in some potential diseases not being timely detected, such as diabetes, coronary artery disease, hypertension, hyperlipidemia, hyperuricemia, etc.

Cancer has figured prominently in the Indian Medical Association study as a causative agent for premature death among medical professionals.[4] However, a direct relationship between doctors' premature death and cancer needs to be examined more precisely through

well-conducted studies. Theoretically, medical professionals are exposed to various occupational and environmental factors that may increase cancer risk. Doctors are a unique group of individuals who are routinely exposed to multiple carcinogens, such as ionizing radiation and various chemicals. Exposure to high doses of diagnostic and therapeutic ionizing radiation is known to increase the incidence of various cancers, like those of the thyroid and the ovary. The high incidence of differentiated thyroid cancers among doctors specialized in various disciplines of radiology is testimony to this. Even young residents in the specialty are reported to be associated with a higher incidence of cancers. Besides radiation and chemicals, the other factor known to cause cancer among doctors is stress itself. Stress caused by a heavy workload, burnout syndrome, compassion fatigue, and chronic sleep deprivation can cause cancer.

In addition to cardiac ailments and cancer, suicide among Indian doctors is a concern and remain one of the important cause of sudden death among medical students/residents and young medical professionals. The medical profession is considered more stressful, but mental health is still a subject of taboo in the medical profession in the Indian context. Medical professionals have a higher suicide risk, 2.5 times more than the general population. [4,5]

How to Reverse this Trend?

Every effort should be made to promote a healthy work-life balance, especially for residents-in-training and female doctors/medical professionals. The important issues need to be addressed, and the nobility of the profession must be restored where health care is not merely a commercial commodity, and doctors aren't money-making machines. Their compassion and empathy need to be preserved, and their grievances are taken into consideration. Medical professionals overlooking their health and ignoring the early warning symptoms is the other primary reason behind premature death. Having greater knowledge and a better understanding of mental and physical health issues, doctors must not undermine their own well-being for the sake of their profession or other things. They will do no good to their patients if they aren't taking adequate care of themselves first. This is why the phrase heal thyself is used by doctors frequently. [4]

The onus is on medical professionals/ophthalmologists to take responsibility for their own health. They must not be reluctant to seek advice from specialists among their colleagues and not attempt to treat themselves. Those known to be genetically prone to vascular disease must pay attention to addressing modifiable risk factors and effective lifestyle changes that could contribute to a catastrophe. Those known to have cancers running in families must subject themselves to stringent cancer-screening programs. Medical professionals /ophthalmologists must function humanely, doing justice to the nobility of their profession and not sidestepping their responsibilities and accountability toward patients. They must keep open the channel of unconditional communication founded on honesty, truth, and readiness to accept responsibility for patients and their families.

We suggest that each and every ophthalmologist/doctor should take responsibility for his/her own health. Medical professionals/ophthalmologists should regularly perform aerobic exercise or connect with families and friends for support instead of excessive smoking and drinking. Besides, regular medical checkup (blood pressure, blood sugar, ECG, Echocardiography, etc) is an effective approach to detecting and decreasing the risk of some potential diseases such as diabetes, coronary artery disease, hypertension, and stroke. Government, non-government organizations, medical/ophthalmic societies, and media should help to improve the working environment and re-establish doctor-patient trust, which may further decrease the sense of "stress/burnout" for doctors. A change of lifestyle and healthy work-life balance adding yoga, exercise, and meditation to reduce stress, maintain quality eating, and maintain body weight can save many young doctor/ophthalmologist lives.

References:

1. Song XN, Shen J, Ling W, Ling HB, Huang YM, Zhu MH, et al. Sudden Deaths Among Chinese Physicians. Chin Med J (Engl) 2015;128:32513.

2. Hoffer EP. America's health care system is broken: what went wrong and how we can fix it. Part 3: hospitals and doctors. Am J Med. 2019; 132: 907-911

3. Shi X, Liu R. Sudden cardiac death in physicians: an alarming problem in China. Anatol J Cardiol. 2018; 19: 158

4. Pandey, Suresh K; Sharma, Vidushi. Doctor, heal thyself: Addressing the shorter life expectancy of doctors in India. Indian Journal of Ophthalmology: July 2019 - Volume 67 - Issue 7 - p 1248-1250
doi: 10.4103/ijo.IJO_656_19

5. Kishor M, Chandran S, Vinay HR, Ram D. Suicide among Indian doctors. Indian J Psychiatry. 2021 May-Jun;63(3):279-284. doi: 10.4103/psychiatry. IndianJPsychiatry_137_20. Epub 2021 Jun 17. PMID: 34211222; PMCID: PMC8221226.

Artificial Intelligence In Ophthalmology

Dr. Arun Kumar Samar[1], Dr. Garima Tiwari[1],
Dr. Isha Arora[1] , Dr. Chandanveer Singh[1]
1: American international institute of MEDICAL Sciences, udaipur

ABSTRACT
ARTIFICIAL INTELLIGENCE [AI] IN OPHTHALMOLOGY is known as capability of a machine to perform tasks that needs human brain power. In present time AI is being used extensively in medicine, additionally has been a normal part of our lifestyle. Emerging concepts like Augmented Medicine and AI plus holds promising results in the field of Ophthalmology. Moreover, new automated tools aids in diagnosing and treating ocular diseases.AI based robotic techniques are enhancing the precision of ophthalmic surgeries. Teleophthalmology powered AI tools helped to achieve services in remote areas. AI mainly constitutes machine learning [ML] and deep learning [DL] that is learning by repeated practice and studying multiple layers, respectively.
The prime focus of this paper is to acknowledge AI in retina, cornea, anterior segment, pediatric Ophthalmology and Ophthalmic surgeries. This paper aims to analyze potential, drawbacks and exceptional benefits of AI in present and future era.
Keywords- AI [Artificial intelligence], ML[Machine learning],DL[Deep learning], CNN [convolutional Neural Networks], NLP [Natural Language Processing], VR[Virtual Reality], AMD [Age Related Macular Degeneration], DR[Diabetic Retinopathy], Optical Coherence Tomography [OCT]

INTRODUCTION
The elementary concept of AI is to construct devices with human intelligence, taking decisions and working like humans. In medicine it is a technical speciality that utilizes the hypothesis, studies the procedure and through a systemic approach implements the intelligence. [1]
The notion of AI came into view in 1950 from scientist Alan Turning who is named as 'Father of AI'. John McCarthy in 1956 coined the term for the same.[2] Conventional AI mostly included prosthetic stents and implants. In recent times, AI has been integrated in our daily lives like smart phones, digital wearables, face recognition, predicting personal choices in online searches, smart homes and many more.
In field of medicine, a new era of augmented medicine has been created utilizing AI in computer assisted surgeries, three-dimensional printing, robotics among myriad of applications.
In ophthalmology, AI has delivered new automated tools for diagnosing and treating ocular diseases. Computer analyzed images are more efficient and objective ways to interpret anterior and posterior segments pathologies.
Teleophthalmology powered AI tools allow clinicians to provide quality health care outside of clinics improving health services to underserved and remote rural population.
Tech Giant, Google partnered with Aravind Eye System and Sankara Nethralaya in development of AI. They used data from Eye PACS-1 and MESSIDOR -2 data set to train AI system.[3]
Overall, AI is the current center of attraction for social, industrial, governance and healthcare development.

SUBGROUPS OF AI
AI constitutes ML [Machine learning] and DL [deep learning]. ML is the potential to learn from data by repeated practice and experience without being programmed[4]. This system is utilized for classification of disease condition. Efficiency of ML can be increased by DL which involves multiple layers of CNN [convolutional Neural Networks]which are specialized to study visual data[5]. Deep learning algorithms can be of two types lesion-based detection systems or image-based detection systems. DL forecasts higher level of results from data using different programs in single domain[6]. NLP [Natural language processing] involves interconnection between computers and human intelligence. VR [Virtual Reality] creates a full-fledged imaginary world cutting out reality . AMD [Age Related Macular Degeneration] detection and rehabilitation devices uses VR technology[7].

ARTIFIAL INTELLIGENCE IN RETINA

Diabetic retinopathy
OCT[Optical Coherence Tomography] , UWF[Ultra widefield Imaging] , REMEDIO are some of the AI tools ,effective in detecting clinically significant macular edema as well as advanced stages of DR[8]. RetmarkerDR can track disease progression by comparing current images to those that were initially screened out, potentially providing insight on

progression of DR[9]. EyeNuk , IDx-DR system are some of the commercially available AI screening aids. Age-related Macular Degeneration

Fundus photographs and OCT are utilized to detect age-related macular degeneration , with estimation of 5-year risk of progression to advanced AMD. AI systems can be trained to perform segmentation, classification and prediction, quantifying intraretinal fluid, subretinal fluid and pigment epithelial detachment[10].

ARTIFICIAL INTELLIGENCE IN GLAUCOMA

Artificial Intelligence extracts proper inference from Optic disc photographs, visual fields, retinal nerve fiber layer thickness, ganglion cell layer thickness, intraocular pressure, and gonioscopy.

Intraocular Pressure (IOP)

AI studied data from Sensimed Triggerfish (Sensimed AG, Lausanne, Switzerland), which is a contact lens based continuous IOP monitoring device which actually measures only the corneal strain changes due to IOP fluctuations[11].

Optic Disc Photography

Fundus photographs help to detect glaucomatous optic neuropathy[12] . Cerentini et al used the GoogLeNet to develop an automatic classification method to detect glaucoma in fundus images[14].

Optical Coherence Tomography (OCT) - RNFL, GCL

OCT analyses disc size, cupping, neuroretinal rim area, RNFL thickness, and GCL thickness. Asaoka et al evaluated a deep learning algorithm that diagnosed glaucoma based on macular OCT for RNFL and GCL[15].

Anterior Segment OCT (AS-OCT)

AS-OCT assesses structure segmentation, measurement, and screening for angle closure[16].

Visual Fields (VF) AI could possibly aid in fast and precise interpretation of visual fields. Asaoka et al used a feed-forward neural network to identify pre-perimetric visual fields which did not meet Anderson-Patella's criteria[17]. Li et al evaluated a Convolutional Neural Network (CNN) to automatically differentiate glaucomatous VFs from non-glaucomatous Vfs[18].

ANTERIOR SEGMENT DISEASES

AI had been initially developed for retinal disorders and glaucoma;[19] recently been utilized in the field of anterior segment diseases[20]. The cornea and the lens are most important refractive structures of the eye, harm to these structures can even result in blindness. Anterior segment AI based applications depends on slit-lamp photography, anterior segment optical coherence tomography (AS-OCT), specular microscopy, corneal tomography/topography, and in vivo confocal microscopy (IVCM)[21].

ARTIFICIAL INTELLIGENCE IN CORNEA

Infectious Keratitis, keratoconus, pterygium, endothelial diseases, and corneal graft are some of the diseases, in which applications of AI are being utilized.

Infectious Keratitis

Infectious keratitis has always been one of the challenging case for diagnosis, Slit-lamp photographs are often used for recording and tracking progress[22]. Aids in correctly classifying corneal ulcers into fungal and bacterial categories[23]

Keratoconus

Corneal topography, corneal tomography, and AS-OCT. KeratoDetect and Ectasia Status Index (ESI) have been developed to detect early keratoconus[24]. Moreover, AI has been recently explored in identifying genes responsible for keratoconus[25].

Corneal Dystrophies and Dysplasia

DL-based algorithms have been used to differentiate normal corneas from edematous corneas, corneal dystrophy from degeneration using a slit-lamp photograph-based and OCT images[26]. Analyzes amyloid deposition in corneal sections[27].

Corneal Nerves

In vivo confocal microscopy [IVCM]] studies sub-basal nerve plexus features, observing its association with ocular and systemic diseases[28].

Corneal Grafts

Corneal topography, tomography, and AS-OCT, specular microscopy images with AI algorithms are being used to study the structure of cornea. U-Net can possibly differentiate normal and pathological corneal endothelium, and detect nascent immune reactions and graft detachments after keratoplasty[29]. Scheimpflug imaging has been shown to predict the need for penetrating and lamellar keratoplasty[30].

ARTIFICIAL INTELLIGENCE IN PAEDIATRIC OPHTHALMOLOGY

Ophthalmic diseases differ between adult and pediatric patients, variations which are to be considered while developing AI applications.

Retinopathy of prematurity (ROP)

ROP has been the major disease for which major AI advances have been made. ROP exams are strenuous , subjective, and treatment is time-consuming[31] . AI algorithm helps in detecting the presence and grading of ROP from fundus photos , being less pain free and stressful for infants[32]. Recent work suggests other potential vessel measurements correlated with plus

disease, such as a decrease in the openness of the major temporal arcade angle , vessel tortuosity[33] .

Strabismus

AI algorithms identifies strabismus based on visual manifestation in the eye regions of facial photos[34] , which would have a huge application for telemedical evaluation. Strabismus is detected using a CNN based on fixation deviations from eye-tracking data [35],and retinal birefringence scanning[36].

Vision Screening

AI aided video frames combines Bruckner pupil red reflex imaging and eccentric photorefraction, Van Eenwyk et al. detected amblyogenic risk factors in young children[36]

Reading disability

Detects reading disability from eye movements during reading[37]

Refractive error

Lin et al.[38] [39] predicted high myopia in children using a random forest, showing good predictive performance for up to 8 years into the future[39].

ARTIFICIAL INTELLIGENCE IN OPHTHALMIC SURGERY

In present times, there has been increased demand for optimal visual and refractive outcome with slightest chance of complications[40]

ARTIFICIAL INTELLIGENCE IN REFRACTIVE SURGERY

In the field of refractive surgery, AI guides in the selection of the type of refractive and pre-operative screening [41]

Post-LASIK Ectasia

Screening before refractive surgeries is highly necessary to recognize risk of iatrogenic ectasia[42]. Lopes et al gave the Pentacam Random Forest Index (PRFI), which was significantly more sensitive and specific than the Belin-Ambrosio enhanced ectasia total derivation (BAD-D) in detecting keratectasia[43].

Nomograms

AI based applications predict appropriate refractive surgery and applied nomogram[44]. Kamiya et [al45] developed an ML-based algorithm to predict the postoperative posterior chamber phakic intraocular lens (IOL) vault using preoperative AS-OCT images of patients undergoing phakic IOL implantation, to predict the achieved vault[46].

Subjective Refraction

Bypassing the subjective refraction, AI predicts the automated refraction based on imaging [47]

Wearable Devices

Visual Behavior Monitor (Vivior AG, Zurich, Switzerland) is a wearable device utilized to objectively calculate preoperative visual pattern of the patient so that an appropriate refractive correction intervention planned[48]

ARTIFICIAL INTELLIGENCE IN CATARACT AND CATARACT SURGERY

Adult cataract

Automated detection and grading is being recently done using slit lamp photographs[49]. In 2019, Zhang et al[50] used fundus imaging for differentiating severity of cataracts[51]. Optical Quality Analysis System (OQAS, Visionmetrics, Spain), a new imaging has been utilized to evaluate the quality of vision[52]. Moreover, posterior capsular opacification (PCO), common complication after cataract surgery, could be predicted using AI algorithms[53] .

Pediatric Cataract

Pediatric examination is difficult and capturing good-quality slit-lamp images is cumbersome[53].122 Lin et al [54] recently developed a model to identify those at high risk of congenital cataracts. Long et al [55] used Bayesian and deep-learning algorithms to create CC-Guardian (congenital cataract), an AI agent that integrates individualized prediction and follow-up with a smartphone application and cloud computing[56].

Intraocular Lens Power Calculation

AI-based IOL formulas have shown to be highly accurate including the HillRadial Basis Function calculator, Kane formula, PEARL-DGS formula, and Ladas formula[56,57,58]. AI based formula, accurately measures anterior chamber depth for IOL position[59]. A recent study developed a new XGBoost ML-based calculator for highly myopic eyes[60].

Teaching and Training

Rendering AI techniques to train young minds, have been explored in recent years[61]. Ability to track pupil, identify the surgical phase, and activating surgical guiding mechanics constitute AI approach for improving surgical outcomes[62].

The utilization of AI for anterior segment diseases still remains primitive[64,65]. Imaging techniques and methods for anterior segment is cumbersome, due to the difference in the magnification, contrast, angle, width

of the light beam, and the transparent nature of the cornea[66]. For making a diagnosis in glaucoma it would be perfect if a single test can be extrapolated through AI reducing the time required for a confirmatory diagnosis and thus allow early diagnosis and treatment[67].

For Pediatric Ophthalmology, disagreement on reference standards occurs due to different opinions of clinicians[68]. There is need for pediatric specific models. Rapid change is associated with poorer outcomes[69,70] ,suggesting that temporal information may have a role in predicting severe disease[71].

The "garbage in, garbage out" phenomenon, whereby the quality of inputs can limit the quality of the outputs, and the "black box dilemma," in which the absence of lucidity in the algorithm may cause a certain level of distrust[72]. It is necessary training sets are generalizable to a large population. Moreover, costs associated with AI operated machines puts additional burden on patient[73].

Newer terminologies and algorithms in AI and ever-increasing ways in which AI is used, require further study which would increase reproducibility and allow generalizability[74] .

Last, but not the least Medico-legal and security of data and set rules should be maintained[74]

CONCLUSION

Recognition of the global burden of Ophthalmic diseases enlightened the unmet demand in screening diseases, especially in resource-poor nations. There is immense capability for future AI applications to all subfields of Ophthalmology. Early diagnosis, accurate identification and classification of diseases, tele ophthalmopathy result in providing efficient healthcare. The algorithms are indeed becoming better, and in the future we hope AI that has phenomenally good sensitivity and specificity that can be matched or surpassed by a human ophthalmologist.

REFERENCES

1-Application of Artificial Intelligence in Medicine: An Overview Peng-ran Liu,# Lin Lu,# Jia-yao Zhang, Tong-tong Huo, Song-xiang Liu, and Zhe-wei Ye

2-Mintz Y, Brodie R. Introduction to artificial intelligence in medicine. *Minim Invasive Ther Allied Technol. s*2019;28(2):7381. doi:10.1080/13645706. 2019.1575882.

3-Gulshan V,Peng L, Coram M , Stumpe MC,Wu D , Narayanaswany A ,et al. Development and validation of a deep learning algorithm for detection of diabetic retinopathy in retinal fundus photographs.

4-Artificial Intelligence. Accessed May 29, 2020. https://www.lexico.com/definition/artificial_intelligence

5-Machine Learning. Accessed May 29, 2020. https://www.lexico.com/definition/machine_learning

6-Neural Network. Accessed May 29, 2020. https://www.lexico.com/en/definition/neural_network

7-Deep Learning. Accessed May 29, 2020. https://en.wikipedia.org/wiki/Deep_learning#Definition

8-Ting DSW, Pasquale LR, Peng L, et al. Artificial intelligence and deep learning in ophthalmology. *British Journal of Ophthalmology.* 2019;103(2):167-175.

9-Leicht, Simon F., et al. "Microaneurysm turnover in diabetic retinopathy assessed by automated RetmarkerDR image analysis-potential role as biomarker of response to ranibizumab treatment." *Ophthalmologica* 231.4 (2014): 198-203.

10-Lee CS, Tyring AJ, Deruyter NP, Wu Y, Rokem A, Lee AY. Deep-learning based, automated segmentation of macular edema in optical coherence tomography. *Biomed Opt Express*. 2017;8(7):34403448. Published 2017 Jun 23. doi:10.1364/BOE.8.003440

11-Martin KR, Mansouri K, Weinreb RN, et al. Use of Machine Learning on Contact Lens Sensor-Derived Parameters for the Diagnosis of Primary Open-angle Glaucoma. *Am J Ophthalmol*. 2018;194:46-53. doi:10.1016/j.ajo.2018.07.005

12-Li Z, He Y, Keel S, Meng W, Chang RT, He M. Efficacy of a Deep Learning System for Detecting Glaucomatous Optic Neuropathy Based on Color Fundus Photographs. *Ophthalmology*. 2018;125(8):1199-1206. doi:10.1016/ j.ophtha.2018.01.023

13-Cerentini A, Welfer D, Cordeiro d'Ornellas M, Pereira Haygert CJ, Dotto GN. Automatic Identification of Glaucoma Using Deep Learning Methods. *Stud Health Technol Inform*. 2017;245:318-321.

14-Haleem MS, Han L, Hemert J van, et al. A Novel Adaptive Deformable Model for Automated Optic Disc and Cup Segmentation to Aid Glaucoma Diagnosis. *J Med Syst*. 2017;42(1):20. doi:10.1007 /s10916-017-0859-4

15-Asaoka R, Murata H, Hirasawa K, et al. Using Deep Learning and Transfer Learning to Accurately Diagnose Early-Onset Glaucoma From Macular Optical Coherence Tomography Images. *Am J Ophthalmol*. 2019;198:136-145. doi:10.1016/j.ajo. 2018.10.007

16- Niwas SI, Lin W, Bai X, et al. Automated anterior segment OCT image analysis for Angle Closure Glaucoma mechanisms classification. *Computer Methods and Programs in Biomedicine*. 2016;130:65-75. doi:10.1016/j.cmpb.2016.03.018

17-Asaoka R, Murata H, Iwase A, Araie M. Detecting Preperimetric Glaucoma with Standard Automated Perimetry Using a Deep Learning Classifier. *Ophthalmology*. 2016;123(9):1974-1980. doi:10.1016/j.ophtha.2016.05.029

18-Li F, Wang Z, Qu G, et al. Automatic differentiation of Glaucoma visual field from non-glaucoma visual filed using deep convolutional neural network. *BMC Med Imaging*. 2018;18(1):35. doi:10.1186/s12880-018-0273-5

19-De Fauw J, Ledsam JR, Romera-Paredes B, et al. Clinically applicable deep learning for diagnosis and referral in retinal disease. Nat Med. 2018;24:13421350.

20-Ting DSJ, Foo VH, Yang LWY, et al. Artificial intelligence for anterior segment diseases: emerging applications in ophthalmology. Br J Ophthalmol. 2021;105:158168

21-Ahuja AS, Halperin LS. Understanding the advent of artificial intelligence in ophthalmology. J Curr Ophthalmol.

22-Dahlgren MA, Lingappan A, Wilhelmus KR. The clinical diagnosis of microbial keratitis. Am J Ophthalmol. 2007;143:940944.

23-Wu X, Qiu Q, Liu Z, et al. Hyphae detection in fungal keratitis images with adaptive robust binary pattern. IEEE Access. 2018

24-Lavric A, Valentin P. KeratoDetect: keratoconus detection algorithm using convolutional neural networks. Comput Intell Neurosci. 2019;2019:8162567.

25-Yousefi S, Yousefi E, Takahashi H, et al. Keratoconus severity identification using unsupervised machine learning. P

26-Eleiwa T, Elsawy A, O¨ zcan E, et al. Automated diagnosis and staging of Fuchs' endothelial cell corneal dystrophy using deep learning. Eye Vis (Lond). 2020;7:44

27-. Kessel K, Mattila J, Linder N, et al. Deep learning algorithms for corneal amyloid deposition quantitation in familial amyloidosis. Ocul Oncol Pathol. 2020;6:5865

28-Shetty R, Sethu S, Deshmukh R, et al. Corneal dendritic cell density is associated with subbasal nerve plexus features, ocular surface disease index, and serum Vitamin D in evaporative dry eye disease. Biomed Res Int. 2016;2016:4369750.

29-Treder M, Lauermann JL, Alnawaiseh M, et al. Using deep learning in automated detection of graft detachment in descemet membrane endothelial keratoplasty: a pilot study. Cornea. 2019;38:157161

30-Vigueras-Guille´n JP, van Rooij J, Engel A, et al. Deep learning for assessing the corneal endothelium from specular microscopy images up to 1 year after Ultrathin-DSAEK surgery. Transl Vis Sci Technol. 2020;9:49.

31-Wang J, Ju R, Chen Y, et al. Automated retinopathy of prematurity screening using deep neural networks. EBioMedicine 2018;35:361368.

32-Redd TK, Campbell JP, Brown JM, et al. Evaluation of a deep learning image assessment system for detecting severe retinopathy of prematurity. British Journal of Ophthalmology 2018:2018313156.

33-Rani P, Elagiri Ramalingam R, Rajamani KT, et al. Multiple instance learning: Robust validation on retinopathy of prematurity. International Journal of Control Theory and Applications 2016;9:451459.

34-Mohney BG, McKenzie JA, Capo JA, et al. Mental illness in young adults who had strabismus as children. Pediatrics 2008;122:1033 1038.

35-Mojon-Azzi SM, Kunz A, and Mojon DS. The perception of strabismus by children and adults. Graefe's Archive for Clinical and Experimental Ophthalmology 2011;249:753 757.

36-Mojon-Azzi SM and Mojon DS. Strabismus and employment: The opinion of headhunters. Acta Ophthalmologica 2009;87:784 788.

37-Rello L and Ballesteros M. Detecting readers with dyslexia using machine learning with eye tracking measures. In: Proceedings of the 12th Web for All Conference (W4A). ACM Press, 2015:16

38,39-Lin H, Long E, Ding X, et al. Prediction of myopia development among Chinese schoolaged children using refraction data from electronic medical records: A retrospective, multicentre machine learning study. PLOS Medicine 2018;15:e1002674.

40-Seiler T, Koufala K, Richter G. Iatrogenic keratectasia after laser in situ keratomileusis. J Refract Surg. 1998;14:312317.

41-Santhiago MR, Smadja D, Gomes BF, et al. Association between the percent tissue altered and post-laser in situ keratomileusis ectasia in eyes with normal preoperative topography. Am J Ophthalmol. 2014;158. 87- 95.e1. Lopes BT, Ramos IC, Saloma˜o MQ, et al. Enhanced tomographic assessment to detect corneal ectasia based on artificial intelligence. Am J Ophthalmol. 2018;195:223232.

42-Chan C, Saad A, Randleman JB, et al. Analysis of cases and accuracy of 3 risk scoring systems in predicting ectasia after laser in situ keratomileusis. J Cataract Refract Surg. 2018;44:979992.

43-Xie Y, Zhao L, Yang X, et al. Screening candidates for refractive surgery with corneal tomographic-based deep learning. JAMA Ophthalmol. 2020;138:519526.

44-45-. Kamiya K, Ryu IH, Yoo TK, et al. Prediction of Phakic Intraocular Lens Vault Using Machine Learning of Anterior Segment Optical Coherence Tomography Metrics: Phakic lens vault prediction using machine learning. Am J Ophthalmol. 2021;226:9099.

46-. Gatinel D, Rampat R, Dumas L, et al. An alternative wavefront reconstruction method for human eyes. J Refract Surg. 2020;36:7481.

47-Varadarajan AV, Poplin R, Blumer K, et al. Deep learning for predicting refractive error from retinal fundus images. Invest Ophthalmol Vis Sci. 2018;59:28612868.

48-Qureshi F, Krishnan S. Wearable hardware design for the internet of medical things (IoMT). Sensors (Basel). 2018;18.

49-Ting DSJ, Krause S, Said DG, et al. Psychosocial impact of COVID-19 pandemic lockdown on people living with eye diseases in the UK. Eye (Lond). 2020. doi:10.1038/s41433-020-01130-4.

50-Xu X, Zhang L, Li J, et al. Representation CNN model for automatic cataract grading. IEEE J Biomed Health Inform. 2020;24:556567.

51-Xiong L, Li H, Xu L. An approach to evaluate blurriness in retinal images with vitreous opacity for cataract diagnosis. J Healthc Eng. 2017;2017:5645498.

52-Xu X, Zhang L, Li J, et al. Representation CNN model for automatic cataract grading. IEEE J Biomed Health Inform. 2020;24:556567

53-Zhou Y, Li G, Li H. Automatic cataract classification using deep neural network with discrete state transition. IEEE Trans Med Imaging. 2020;39:436446.

54-. Lin D, Chen J, Lin Z, et al. A practical model for the identification of congenital cataracts using machine learning. EBioMedicine. 2020;51:102621.

55-. Long E, Chen J, Wu X, et al. Artificial intelligence manages congenital cataract with individualized prediction and telehealth computing. NPJ Digit Med. 2020;3:112.

56-Xia T, Martinez CE, Tsai LM. Update on intraocular lens formulas and calculations. Asia Pac J Ophthalmol (Phila). 2020;9:186193.

57-Sramka M, Slovak M, Tuckova J, et al. Improving clinical refractive results of cataract surgery by machine learning. PeerJ. 2019;7Wan KH, Lam TCH, Yu MCY, et al. Accuracy and precision of intraocular lens calculations using the new Hill-RBF Version 2.0 in eyes with high axial myopia. Am J Ophthalmol. 2019;205:6673:e7202.

58-Kane JX, Van Heerden A, Atik A, et al. Accuracy of 3 new methods for intraocular lens power selection. J Cataract Refract Surg. 2017;43:333 339.

59-Li T, Stein JD, Nallasamy N. AI-powered effective lens position prediction improves the accuracy of existing lens formulas. medRxiv. 2020. doi:10.1101/2020.10.29.20222539.

60-Carmona-Gonza´lez D, Palomino-Bautista C. Accuracy of a new intraocular lens power calculation method based on artificial intelligence. Eye (Lond). 2021;517522.

61-Al Hajj H, Lamard M, Conze PH, et al. CATARACTS: challenge on automatic tool annotation for cataRACT surgery. Med Image Anal. 2019;52:2441.

62-Yu F, Silva Croso G, Kim TS, et al. Assessment of automated identification of phases in videos of cataract surgery using machine learning and deep learning techniques. JAMA Netw Open. 2019;2:e191860.

63-Ting DSW, Cheung CY-L, Lim G, et al. Development and Validation of a Deep Learning System for Diabetic Retinopathy and Related Eye Diseases Using Retinal Images From Multiethnic Populations With Diabetes. *JAMA*. 2017;318(22):2211. doi:10.1001/jama.2017.18152.

64,65-Artificial Intelligence in Cornea, Refractive Surgery, and Cataract: Basic Principles, Clinical Applications, and Future Directions Radhika Rampat, MBBS, FRCOphth, Rashmi Deshmukh, MBBS, FCRSy, Xin Chen, PhDz, Daniel S.W. Ting, MD, PhD§{, Dalia G. Said, FRCS(Ed), MDjj, Harminder S. Dua, FRCOphth, PhDjj, and Darren S.J. Ting, MBChB, FRCOphth

66-Artificial Intelligence in Cornea, Refractive Surgery, and Cataract: Basic Principles, Clinical Applications, and Future Directions Radhika Rampat, MBBS, FRCOphth, Rashmi Deshmukh, MBBS, FCRSy, Xin Chen, PhDz, Daniel S.W. Ting, MD, PhD§{, Dalia G. Said, FRCS(Ed), MDjj, Harminder S. Dua, FRCOphth, PhDjj, and Darren S.J. Ting, MBChB, FRCOphth{jj

67-https://eyewiki.aao.org/Artificial_Intelligence_in _Glaucoma

68- Heneghan C, Flynn J, O'Keefe M, and Cahill M. Characterization of changes in blood vessel width and tortuosity in retinopathy of prematurity using image analysis. Medical Image Analysis 2002;6:407429.

69-Heneghan C, Flynn J, O'Keefe M, and Cahill M. Characterization of changes in blood vessel width and tortuosity in retinopathy of prematurity using image analysis. Medical Image Analysis 2002;6:407429.

70-Wallace DK, Kylstra JA, and Chesnutt DA. Prognostic significance of vascular dilation and tortuosity insufficient for plus disease in retinopathy of prematurity. Journal of AAPOS 2000;4:224229.

71- Artificial Intelligence for Pediatric Ophthalmology Julia E. Reid, MD m,† and Eric Eaton, PhD‡

72- https://eyewiki.aao.org/Artificial_Intelligence_in _Retina

73-Keane PA, Topol EJ. With an eye to AI and autonomous diagnosis. *npj Digital Medicine*. 2018;1(1). doi:10.1038/s41746-018-0048-y.

74-Artificial Intelligence in Cornea, Refractive Surgery, and Cataract: Basic Principles, Clinical Applications, and Future Directions Radhika Rampat, MBBS, FRCOphth, Rashmi Deshmukh, MBBS, FCRSy, Xin Chen, PhDz, Daniel S.W. Ting, MD, PhD§{, Dalia G. Said, FRCS(Ed), MDjj, Harminder S. Dua, FRCOphth, PhDjj, and Darren S.J. Ting, MBChB, FRCOphth

"Alarming Increase in Consumer Cases/Medical Malpractice Claims in India" How Medical Professionals Can Protect Themselves ?

Dr. Suresh K. Pandey
MBBS, MS (Ophthalmology, PGIMER, Chandigarh)
Ant. Segment Fellowship (USA & Australia)
President-Kota,Divi.Ophthalmological Society(KDOS)
V-President, Indian Medical Association (IMA)KOTA
Director, SuVi Eye Institute & Lasik Laser Center
C 13 TALWANDI, KOTA, RAJ. 324 005, INDIA
Email:suresh.pandey@gmail.com
Website: www.suvieyehospital.com
www.drsureshpandey.com

Dr. Vidushi Sharma
MBBS, MD (AIIMS, New Delhi), FRCS (UK)
Oculoplastic Surgery Fellowship (Australia)
Author : Meri Kitab Meri Dost : A Motivational Book for Youth
Director, SuVi Eye Institute & Lasik Laser Center
C 13 TALWANDI, KOTA, RAJ. 324 005, INDIA

Corresponding Author: Dr. Vidushi Sharma MBBS, MD (AIIMS, New Delhi), FRCS (UK), Director, SuVi Eye Institute & Lasik Laser Center, C 13 Talwandi, SuVi Eye Hospital Road, Kota, Rajasthan, India, E-mail:suvieye@gmail.com

"The important question isn't how to keep bad physicians from harming patient; it's how to keep good physicians from harming patients. Medical malpractice suits are a remarkably ineffective remedy. Fewer than 2 percent of the patients who had received substandard care ever filed suit. Conversely, only a small minority among patients who did sue had in fact been victims of negligent care. And a patient's likelihood of winning a suit depended primarily on how poor his or her outcome was, regardless of whether that outcome was caused by disease or unavoidable risks of care. The deeper problem with medical malpractice is that by demonizing errors they prevent doctors from acknowledging & discussing them publicly. The tort system makes adversaries of patient & physician, and pushes each other to offer a heavily slanted version of events."

Dr. Atul Gawande, Complications : A Surgeon's Notes on an Imperfect Science

Medical professionals are now accountable to the public under the Consumer Protection Act (COPRA), 1986, which came into force in 1988. The act recognizes a consumer's right to safety, information, choice, redressal, consumer education, and to be heard. The inclusion of medical services under COPRA has evoked scathing criticism from medical professionals, which argues doctors will have to practice "Defensive Medicine" while treating/operating patients and undertake multiple consultations. Medical professionals will also be forced to insure themselves heavily against malpractice suits.

Alarming Rise in Consumer Cases :

India is witnessing an alarming rise in medical negligence cases filed in consumer courts against hospitals and medical professionals. According to published reports [1-4] , there is a 110% rise in the number of medical negligence cases reported every year. The majority of medical negligence cases filed in consumer courts involve obstetrics and gynecology followed by cases related to orthopedics, and other medical and surgical branches.[1-4] Heavy compensation was ordered in some of these cases. In a judgment given in October 2013 on medical negligence, the Supreme Court awarded compensation amounting to Rs. 11 Crore to a victim, which was to be paid by the doctors and the private hospital deemed responsible for the wrongful death of a patient. This landmark decision was by far the largest compensation award in the history of Indian medical negligence litigation. The National Consumer Disputes Redressal Commission (NCDRC), New Delhi, on August 26, 2022, awarded an exemplary compensation of Rs. 1 Crore to the parents of a 6-year-old child. The child was admitted for squint eye correction surgery and died while undergoing squint

surgery at an Eye Hospital in Chennai. In July 2015, the Supreme Court ordered a compensation of Rs 1.7 Crore to a girl who lost vision soon after birth due to medical negligence by doctors of a government hospital in Tamil Nadu.

The medical profession is considered to be one of the noblest professions in the world. While Indian medical infrastructure is being noticed and praised on the global map, yet within the country, the doctor-patient relationship is deteriorating, and the medical setup is facing extensive problems, with medical litigation fast becoming one of the most serious of all issues. Medical professionals are no longer regarded as infallible and beyond questioning. We live in a culture in which displeased patients have increasingly turned to litigation as a means of obtaining redress from perceived deficiencies in the quality of care received from their treating physicians. Consumer cases are increasing not only for the medical branches dealing with life and death (emergency medical branches) or dealing with two lives (such as obstetrics and gynecology) but also for doctors working in OPD/daycare set up like ophthalmology, dental surgery, dermatology, and diagnostic branches like radio-diagnosis, pathology are also increasingly facing consumer cases/litigations.

How to Minimize Consumer Cases & How to Safeguard Medical Professionals?

Despite the best possible care, best intentions, and best medical practices, some complications are bound to occur, and at these times, compassionate care, effective communication with the patients and attendants is the key to avoiding these complications from becoming lawsuits. While communicating with these patients, we need to be honest and sympathetic but not overly defensive. It helps to clearly admit that a problem has occurred rather than being evasive. However, the responsibility doesn't end with good communication; we need to do our best to ensure that the complications are handled well or referred to the right place at the right time. Support the patient at this time by explaining to the attendants, helping to take the patients elsewhere, etc. The right attitude, compassion, and communication at this crucial time can make a huge difference to the reaction of the patients and avoid litigation despite unfavorable outcomes.

Timely referral to an expert is vital for managing a difficult situation or any specific disease. Never criticize or disapprove of treatment or surgery done by your professional colleague in front of patients or relatives, as it can provoke them to file malpractice lawsuits. The increased cost of healthcare service delivery has ultimately led patients to have higher expectations from medical care providers. Combined with the increased awareness and the availability of means to vocalize their grievances, patients can highlight cases of negligence even for the smallest deficiency in the service.

The best way to handle consumer cases/medico-legal issues is by preventing them by 6 Cs: Checklist, Cost, Consent, Counseling, Complications Management, and Coverage by Insurance.[3-7]

The WHO Surgical Safety Checklist is an often-used example of a surgical checklist intended to ensure safe surgery and minimize complications. Train your entire team to follow the checklists and protocols. Examine each and every patient very carefully. Ask for the previous medical records and never forget to take a complete history of systemic illness, drug allergy, previous surgery or trauma, etc.

It is important to counsel and explain to each and every patient about the surgery, cost, outcome after surgery, need for follow-up, and possible complications. The preoperative stage entails taking valid informed consent (video consent in all high-risk cases) of the patient for executing the proposed treatment, taking and recording the history of the patient, carrying out a proper examination, diagnosis, and investigations, pre-anesthetic check-up, detailed counseling, complete systemic investigations (and clearance for surgery) and then proceeding with treatment.

Always take the help of an anesthesiologist for monitoring vital parameters after taking patients to the operation theater. The surgeon and entire team should be vigilant to minimize the complications encountered during the surgery in the operation theater, accidents, drug reactions, and mishaps experienced while operating (for example, surgery in the wrong patient/wrong eye/the wrong side, implanting the wrong prosthesis/IOL/ implant), death during operation, and other similar incidents. Always document all operative notes, follow-up advice, detailed instructions about using the medications/eye drops, and communication about the postoperative complications etc. Several medical professionals use abbreviations and short forms instead of detailed notes, and this needs to be avoided, especially in the instructions for the patients.

Always explain the prognosis/complications/adverse outcomes in simple words using language spoken by patients. It may be helpful to write about the treatment details/prognosis/outcome in the regional language on the discharge/follow-up records so the patient (and his relatives) can read and understand clearly.

Coverage by Insurance (Professional Liability Insurance) :

Medical professionals must cover themselves under professional liability insurance. One may take medical societies' help for bulk purchases and reduce the premium. A group of doctors can always negotiate better terms with the insurer than any individual. If the Insurance company is being changed, one should always insist on the retroactive cover.

Training of Your Team :

Periodical training/checking of your staff members and operation theater (OT) team is a must to ensure they follow the checklist and protocols to minimize any error(s) when the patient is taken for surgery. Double-check the patient records, investigation reports, consent signed by the patient, site of operation, and medical records related to systemic illness, etc., before taking the patient to the operation theater. Always check the prosthesis/implant/intraocular lens type and its power, carefully inspect the irrigating solution for any floating particles, and always cross-check the date of expiry of drugs and devices. In ophthalmology, for example, train your entire OT team to always follow the practices to minimize postoperative endophthalmitis, such as application of adhesive drapes, pre-operative cleaning of the eye and peri-ocular area with 5% povidone-iodine solution, and instillation of one drop of povidone-iodine solution after completion of intraocular surgery.

Avoid unnecessary conversation (including jokes, irrelevant talk, scolding your staff, etc.) in the operation theater premises in the presence of a patient (or relatives) scheduled for any procedure or surgery. Exercising utmost care while performing any surgery under topical or local anesthesia is important as the patient is actively listening to all conversations and may (wrongly) correlate negligence in case of a lack of desired results.

Take Home Message:

The number of cases against medical professionals for malpractice is increasing because of increased internet awareness ('Dr. Google') among patients. While very few cases may be legitimate and based on clinical negligence exercised by doctors, most medical professionals are wrongfully accused because of the lack of public understanding. The ophthalmic professionals must communicate empathetically, emphasize diligent service delivery and also maintain proper records about the patient history, consent, and treatment. This practice will bring down the alleged incidents of malpractice and will protect medical professionals from fake lawsuits

It is imperative to take substantial measures to ensure due diligence while performing surgical procedures, follow the provided guidelines, and take all necessary measures before performing any surgery in the hospital. Following surgical checklists, protocols, proper documentation (maintaining medical records), taking informed consent, communication about the outcome of the procedure or treatment, timely referral of the patient (in case of any complication), and obtaining adequate professional liability insurance coverage are a few important tips to minimize the risk of litigation against medical professionals and medical professionals. .

There is an urgent need to evaluate the manner in which India chooses to address medical negligence/errors. In addition to the fear of defensive medicine, increasing insurance premiums, and rise in costs for patients, it is time we are aware of the inequity that the present system perpetuates. Systemic deficiencies such as very heavy malpractice/litigation costs, delayed and protracted litigation, as well as dependence on judicial discretion do not provide effective justice to victims and could harm medical professionals and hospitals as well. In a developing country like India, where there is an abysmally low investment in health, the paucity of trained human resources, a huge gap between urban and rural health care, and poor political/administrative will to improve the health sector, it would be wise to implement a no-fault liability system within the public health sector and also to have caps on the amount of compensation after carrying out due research and discussion. The government also needs to act and invest in health care (at least 5 percent of GDP) before it is too late.

India needs to overhaul the present system of addressing medical negligence using all of the above-mentioned solutions effectively. Medical **professional bodies of India should ask the ministry of law to cap compensation for malpractice.** *It is time for the Indian Medical Association (IMA) and other medical societies to work together to ensure the safety of practicing medical professionals and hospitals.*

References:

1. Agrawal A. Medical negligence: Indian legal perspective. Ann Indian Acad Neurol. 2016 Oct;19(Suppl 1):S9-S14. doi: 10.4103/0972-2327.192889. PMID: 27891019; PMCID: PMC5109761.

2. Chandra MS, Math SB. Progress in Medicine: Compensation and medical negligence in India: Does the system need a quick fix or an overhaul?. Ann Indian Acad Neurol 2016;19, Suppl S1:21-7

3. Pandey SK, Sharma V. Commentary: Increasing cases of litigations against ophthalmologists: How can we minimize litigations during ophthalmic practice?. Indian J Ophthalmol 2019;67:1527-30

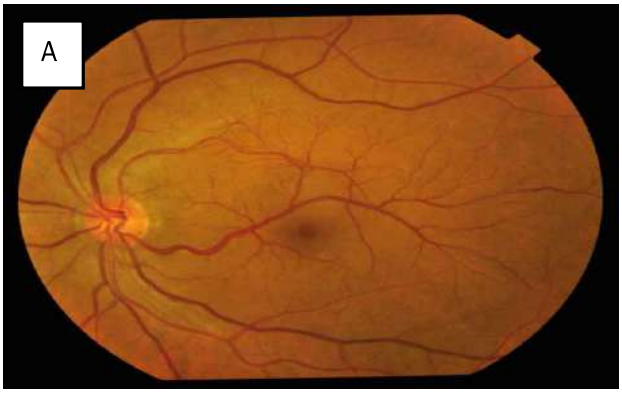
4. Pandey SK. How to minimize litigations and medical malpractice claims during ophthalmic practice? Kerala J Ophthalmol 2022;34:8-11.

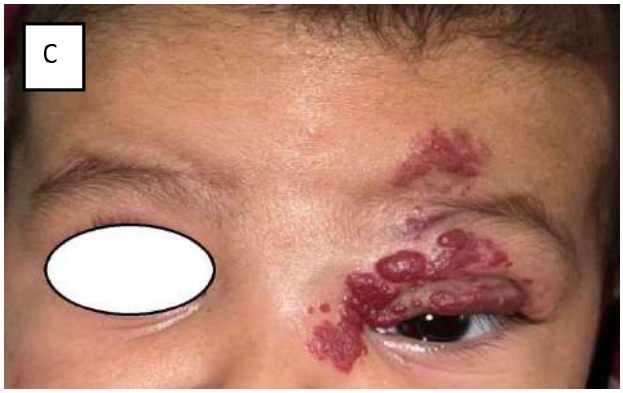
5. Secrets of Successful Doctor : The Complete Guide to a Fulfilling Medical Career. Dr Suresh K Pandey, Maple Press, Pblishing, New Delhi, 2019.

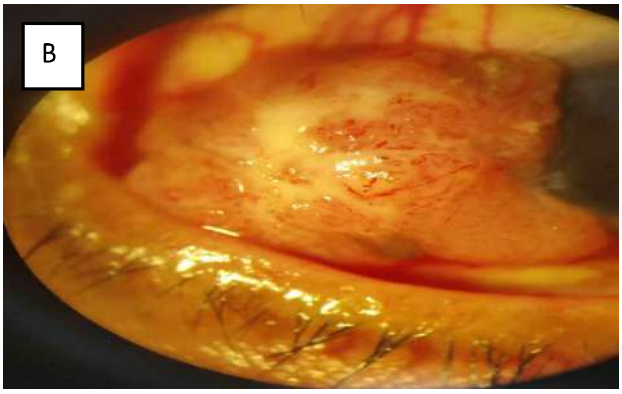
6. A Hippocratic Odyssey: Lessons From a Doctor Couple on Life in Medicine, Challenges and Doctorpreneurship. Dr Suresh K. Pandey, Dr. Vidushi Sharma, Bloomsbury, New Delhi, India, August 2020.

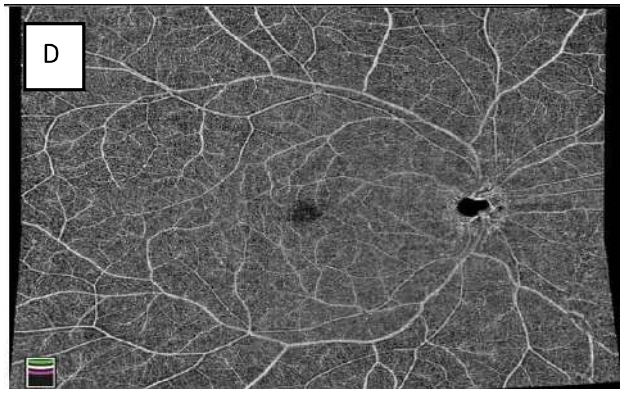
7. Entrepreneurship for Doctors: How to Build Your Own Successful Medical Practice. Dr. Suresh K. Pandey, Maple Press (Pblishing), Noida, India.

Ophthalmic Quiz- Spot Diagnosis









"Practices Among Glaucoma Patients Attending Tertiary Care Hospital"

Raghunandan Khandelwal[1], Archana Garg[1], Manoj Kumar Gupta[2]
1. Department of Ophthalmology, JLN medical college, Ajmer.
2. Department of PSM, SMS medical college, Jaipur.

Abstract
Introduction: Glaucoma is the second leading cause of blindness around the globe, accounting for up to 8% of total blindness. In India, Glaucoma is one of the major causes (5.5%) of irreversible blindness. Health literacy is an essential component of empowering individuals and their families. Material and method: This cross-sectional, hospital-based study was conducted among 200 consecutive glaucoma patients who attended the OPD or Indoors at Department of ophthalmology, JLN Medical College and Hospital, Ajmer. Result: Total 200 glaucoma patients were interviewed. Of which 130(65%) were male, and 70(35%) were female, with mean age 59.7+11.2 years. 167(83.5%) patients were taking their medication daily, in which 137(68.5%) were taking it timely.113(56.5%) patients were storing their medication hygienically at a cool and dry place. Only 50(25%) patients washed their hands before instilling eye drops. 138(69%) patients kept time gap between instilling two eye drops. 161(80.5%) patients were not using eye drops which were opened for >40 days. 100(50%) patients were able to afford the cost of medication. 180(90%) patients family members were not screened for Glaucoma. 165(82.5%) patients timely visited their ophthalmologist. 55(27.5%) patients were aware to bring their glaucoma diary in their next doctor visit. Conclusions: In this study, we found that most of the patients were practicing in right manner only with regular medication, regular ophthalmologist visit, and not using eye drops vial >40 days old, while other practices need to be improved. Keywords: Practices, Glaucoma

Introduction
The word "glaucoma" is derived from the ancient Greek word glaukos, which means 'shimmering'[1]. Glaucoma is a group of disorders, characterized by a progressive optic neuropathy that result in a characteristic appearance of the optic disc and a specific pattern of irreversible visual field defects that are associated frequently but not invariably with raised intraocular pressure (IOP)[2-3]. Glaucoma is the second leading cause of blindness around the globe, accounting for up to 8% of total blindness[4]. In India, Glaucoma is one of the causes (5.5%)[5] of irreversible blindness. More than 90% of cases of Glaucoma remain undiagnosed in the community[6]. In sustainable developmental goals (SDG), 3rd goal includes the promotion of universal health coverage, which provides opportunities to include eye health services[7]. Health literacy is an essential component of empowering individuals and their families. Glaucoma is avoidable with early detection and timely intervention[3]. World Glaucoma Week is celebrated from 10 to 16 March with the main objective to eliminate glaucoma blindness by motivating people to have regular eye check up. First-degree relatives (FDRs) of glaucoma patients have a ten-fold increase in risk of Glaucoma[5].

Aim
To evaluate the practices in glaucoma patients with their demographic features and prevention of associated blindness. It serves as behaviour diagnosis of the community.

Materials and methods
Study design: Hospital based, Cross-sectional study.Study area: Regional area of Ajmer.

Study population: Glaucoma patients who attend the OPD/IPD in Department Of Ophthalmology, JLN medical college, Ajmer. Study period: Data collection was taken after taking approval from Research Review Board, and Ethics Committee.

Sample size: A sample of 177 cases was calculated at 95% confidence and precision level of 5% to verify the 13.3 % prevalence of glaucoma awareness in the population (as per seed article)[8].

The sample size has been enhanced & rounded off to 200 cases. This sample size is also adequate to cover all other study variables.

Sampling technique: This cross-sectional, hospital-based study was conducted after Institutional Ethics Committee approval, work carried out among 200 consecutive glaucoma

patients who presented at the out-patient/in-patient at Department of ophthalmology, JLN Medical College and Hospital, Ajmer. All the patients were diagnosed with Glaucoma and started on treatment for the same. After obtaining informed consent, the patients were interviewed according to a pre-tested standard proforma which contained 10 close-ended questions by study investigators to assess their practices about Glaucoma

.

Inclusion criteria

1. Both male & female patients having Glaucoma
2. Age 40 years or above

Exclusion criteria

1. Any other intraocular disease except Glaucoma
2. Congenital and Juvenile Glaucoma
3. Not willing to give consent for this study

Statistical analysis: The data so collected were entered into Microsoft Excel version 2013 and statistically analyzed using Primer.

Result

Total 200 glaucoma patients were interviewed. Of which 130(65%) were male and 70(35%) were female. The mean age was 59.7±11.2 years. 101(50.5%) patients were from urban backgrounds. 10(5%) patients were aware about family history of Glaucoma. 167(83.5%) patients were taking their medication daily in which 137(68.5%) were taking it timely while 62(31%) patients were not punctual for their medication. 113(56.5%) patients were storing their medication hygienically at cool and dry place. Only 50(25%) patients washed their hands before instilling eye drops. 138(69%) patients kept a time gap between instilling two eye drops, while 27(13.5%) were sometimes, and 35(17.5%) were not keeping any time gap between two eye drops. 161(80.5%) patients were not using eye drops vial, which were opened for >40 days. 100(50%) patient were able to afford the cost of medication while 24(12%) were sometimes do to and 76(38%) were not able to afford the cost of mediation. 180(90%) patient's family members were not screened for Glaucoma, while only 5 (2.5%) patients got their family members screened for Glaucoma, and few family members were screened in rest 15(7.5%). 165(82.5%) patients timely visited their ophthalmologist. 55(27.5%) patients were aware to bring their glaucoma diary in their next doctor visit, while 64(32%) sometimes brought and 81(40.5%) never brought their glaucoma diary. A significant association was found for better practices in urban patients [OR=3.3(95% CI:1.8-6.1), P=0.00], in higher educational status [$\chi 2$=15.8, df=2, P=0.00] and in higher socio economic class [$\chi 2$=10.2, df=4, P=0.04] while sex of patient [OR=0.8(95% CI:0.4-1.5) p-value = 0.62], and age [t=0.06 (95% CI:-3.3-3.5), P=0.95] had no significant difference (p-value<0.05).

Discussion

Shan Li et.al. (2020)[9] study found that the mean age is 68.6±15.0 years, while in this study mean age was 59.7±11.2 years. Tripathi S et al. (2017)[10] study showed that out of 198 patients enrolled, 30.8% were females, 30.8% were in the age group of 61-70 years age group, 60.1% had an urban background, while in this study, 35% were female, 29% belongs to age group 60-70 years and 50.5% were urban. Raiturcar TP et al. (2019)[11] stated that 72% were using the anti-glaucoma medications regularly, and 70% were following up regularly, and only 32% had brought their family members for glaucoma screening. In a study by Biradar P et al. (2019)[12] 80% understood the need for regular medications, 40% required the need for regular ophthalmologist visits, 66% were using the medications regularly, and 80% were on regular follow-up. While in this study, 83.5% were using the anti-glaucoma medications regularly, 82.5% were following up regularly, only 2.5% screened their family, and 7.5% screened few members of family. In Mohindroo C et.al. (2015)[13] study, only 61.4% ofsubjects knew that the eye drops should be stored in cool and dry place, and nearly 30% participants believed that two eye drops could be instilled back to back while in this study 56.3% subjects knew that the eye-drops should be stored in cool and dry place and 31% participants believed that two eye-drops could be instilled back to back. Tripathi S et al. (2017)[10] study found that the level of education and socioeconomic status were statically significantly related to practice in medication (p-value<0.05). In his study, we also found that level of education, socioeconomic class, and urban residence were statically significantly related to practice.

Conclusions

In this study, we found that most of the patients were practicing in right manner with regular medication, regular ophthalmologist visit, and not using eye drops vial >40 days old, while other practices need to be improved. Glaucoma can cause irreversible blindness and is often detected in very late phase, so screening is the only tool for early diagnosis. In this study, we found very few patients got their family members screened for Glaucoma. Strategies such as intensifying one-on-one counseling, formation of glaucoma patient groups should be utilized to improve the practices of glaucoma patients(8-9). Developing of new technologies (like mobile app) can also improve record keeping, reminder for medication and follow-up.

Bibliography

1. Leffler CT, Schwartz SG, Stackhouse R, Davenport B, Spetzler K. Evolution and Impact of Eye and Vision Terms in Written English. JAMA Ophthalmol. 2013; 131(12): 162531.

2. Khurana AK, editor. Comprehensive ophthalmology. 7th ed. Jaypee; 2019. page 231.

3. Salmon JF, author. Kanski's clinical ophthalmology. 9th ed. Elsevier; 2020. page 349.

4. World Health Organization. Available from: https://www.who.int/news/item/08-10-2019-who-launches-first-world-report-on-vision

5. National Programme for Control Blindness. Available from: https://npcbvi.gov.in/write Read Data/ mainlinkFile/File341.pdf

6. National Health Portal. Available from: https://www.nhp.gov.in/disease/eye-ear/glaucoma

7. Sustainable Development Goal. Available from: https://sdgs.un.org/goals

8. Sathyamangalam R V, Paul P G, Ronnie G et.al. Determinants of glaucoma awareness and knowledge in urban Chennai. Indian J Ophthalmol. 2009; 57: 355-56.

9. Shan Li L, Yan Ge Z , Lohfeld L. Knowledge, attitudes and practices related to seeking medical eyecare services by adults with moderate-to-severe visual impairment in rural Yueqing, Wenzhou, China: a cross-sectional survey. Int J Ophthalmol. 2020; 13(7): 1115-23.

10. Tripathi S, Gupta S, Arora V. Socio-demographic determinants of glaucoma medications compliance: A North Indian cross sectional study. Indian Journal of Clinical and Experimental Ophthalmology. 2017; 3(1): 53-56.

11. Raiturcar TP, Cacodcar JA, Vernekar P. Knowledge, Attitude and Practices about Glaucoma among Glaucoma Patients at a Tertiary Care Hospital in Goa. Delhi J Ophthalmol. 2019; 29: 98-101.

12. Biradar P, Gagan YM. A study to assess the knowledge, attitude and practices about glaucoma among glaucoma patients at a peripheral referral centre. MedPulse International Journal of Ophthalmology. 2019; 12(1): 10-13.

13. Mohindroo C, Ichhpujani P, Kumar S. How 'Drug Aware' are our Glaucoma Patients? Journal of Current Glaucoma Practice. 2015; 9(2): 33-37.

Table - 1 Demographic profile of patients :

Profile	n=200 (%)
Age (yrs)	
40 to <50	43 (21.5%)
50 to <60	53 (26.5%)
60 to <70	58 (29%)
70 to <80	39 (19.5%)
>80	7 (3.5%)
Sex	
Male	130 (65%)
Female	70 (35%)
Residence	
Rural	99 (49.5%)
Urban	101 (50.5%)
Education status	
Uneducated	48 (24%)
Primary education	40 (20%)
Upper primary (6-8)	34 (17%)
Secondary (9-10)	23 (11.5%)
Sen. secondary (11-12)	21 (10.5%)
Graduate	34 (17.5%)
Socio-economic status (Modified B J Prasad 2021)	
Class 1	35 (17.5%)
Class 2	67 (33.5%)
Class 3	65 (32.5%)
Class 4	25 (12.5%)
Class 5	8 (4%)

Occupation status	
Unskilled	52 (26%)
Semiskilled	20 (10%)
Skilled	26 (13%)
Professional	7 (3.5%)
House wife	68 (34%)
Unemployed / Retired	27 (13.5%)
Systemic disease	90 (45%)
Allergy	7
Thyroid	6
COPD	9
Diabetes	47
Hypertension	53
CAD	2
Habit	65 (32.5%)
Alcohol	4
Tobacco	55
Tobacco + Alcohol	6
Family History	10 (5%)

Table-2 Practice profile of patients:

Practice	**Right** **N (%)**	**Wrong** **N (%)**	**Sometime** **N (%)**
1. Regular medication	167 (83.5%)	0	33 (16.5%)
2. Timely medication	137 (68.5%)	1 (0.5%)	62 (31%)
3. Drug storing	113 (56.5%)	37 (18.5%)	50 (25%)
4. Hand wash before using eye drops	50 (25%)	97 (48.5%)	53 (26.5%)
5. Time gap between two eye drops	138 (69%)	35 (17.5%)	27(13.5%)
6. Using open eye drops vial > 40 days	161 (80.5%)	12 (6%)	26 (13%)
7. Afford the cost of medication	100 (50%)	76 (38%)	24 (12%)
8. Family members screening	5 (2.5%)	180 (90%)	15 (7.5%)
9. Regular ophthalmologist follow up	165 (82.5%)	17 (8.5%)	18 (9%)
10. Aware to bring glaucoma diary on each doctor visit	55 (27.5%)	81 (40.5%)	64 (32%)

Figure 1: Practice profile of patients

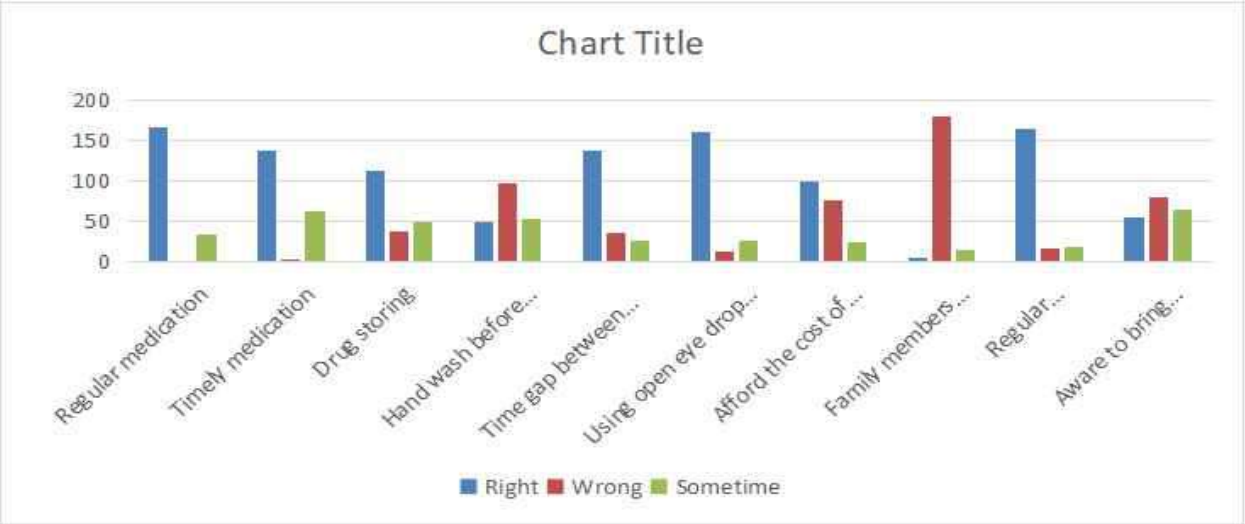


Table 2: Determinants of practices for glaucoma

Grade	Good practice *n*=137, *n* (%)	Poor practice *n*=63, *n* (%)	Validation
Gender Male Female	87 (63.5%) 50 (36.5%)	43 (68.3%) 20 (31.7%)	OR=0.8(95% CI:0.4-1.5), *P*=0.62
Residency Urban Rural	80 (58.4%) 57 (41.6%)	21 (33.3%) 49 (77.7%)	OR=3.3(95% CI:1.8-6.1), *P*=0.00
Education Up to primary (upto 5th) Schoolling (6 to 10th) High school/College	49 (35.8%) 40 (29.2%) 48 (35%)	39 (61.9%) 17 (27%) 7 (11.1%)	2=15.8, df=2, *P*=0.00
SES* Class 1 Class 2 Class 3 Class 4 Class 5	31 (22.6%) 47 (34.3%) 40 (29.2%) 15 (10.9%) 4 (3%)	4 (6.3%) 20 (31.7%) 25 (39.7%) 10 (15.9%) 4 (6.4%)	2=10.2, df=4, *P*=0.04
Age, mean ± SD	59.8 ± 11.2	59.7 ± 11.2	t=0.06 (95% CI:-3.3-3.5), *P*=0.95

*SES: Socio economic status [Modified B J Prasad scale revised for year 2021 (Base year 2016 = 100)], *P*<0.05 is statistically significant. SD: Standard deviation, OR: Odds ratio, CI: Confidence interval

Neovascular Glaucoma A Trouble

Dr. Jaishree Singh[1] MS, Dr. Anita Rani [1] MBBS,
Dr. Ekta karhana[1] MBBS, Dr. Pooja kapadia[1] MBBS
1: Department of ophthalmology, GMC Kota, Rajasthan

Introduction

Neovascular glaucoma (NVG) is a form of secondary glaucoma characterized by new vessels on the iris and angle of the anterior chamber (AC). It is usually associated with a poor visual prognosis.[1][2][3] The mechanism of anterior segment neovascularization is ischemia of the posterior segment of the eye resulting from a number of ophthalmic and systemic etiologies.[3][4] The most common etiologies include proliferative diabetic retinopathy (PDR), central retinal vein occlusion (CRVO), and ocular ischemic syndrome (OIS).[5]

In 1906, Coats described new vessels over the iris (rubeosis iridis) in a patient with CRVO. Due to the formation of new vessels in the anterior segment of the eye, the rise in intraocular pressure, and the connective tissue growth, the term NVG was coined by Weiss et al. [6] Some other synonyms used for NVG are hemorrhagic glaucoma, thrombotic glaucoma, and congestive glaucoma.[2]

Epidemiology

The incidence and prevalence of NVG vary in different populations and according to various etiological diseases causing NVG. The prevalence of NVG in the population is low, 0.12% in migrant Indians in Singapore[7] , 0.01% in the Hooghly River Study (West Bengal, India).[8] In hospital-based studies, the proportion of eyes with NVG among the secondary glaucomas was 917.4%.[9][10]

In a tertiary eye hospital in China, the number of NVG cases was found to be 483 (5.8 %) out of the 8306 glaucoma patients seen over a period of 11 years.[11]

Though the overall prevalence of NVG is low, it is refractory to treatments, and visual morbidity is significant for the patient. There are increasing numbers of NVG cases, probably due to the rise in the number of patients with diabetes and other non-communicable diseases, which are risk factors for retinovascular entities such as diabetic retinopathy, retinal vein occlusions, and ocular ischemic syndromes. Knowledge of the evaluation and management of NVG is crucial for all ophthalmologists.

Etiology

A large number of ocular and systemic disorders could cause NVG (table 1) [12][13][14][15][16] But three quarters of times it is caused by three conditionsdiabetic retinopathy (DR) (33%), ischemic CRVO (33%), and the ocular ischemic syndrome (OIS) (13%).[17] Up to 60% of the eyes with ischemic CRVO develop neovascularization of the anterior segment of the eye within a few weeks to 2 years after the onset of CRVO. Eyes with non-ischemic CRVO have a risk of conversion to ischemic CRVO, which has been reported to occur at a rate of 3.3% by four months and an incidence rate ten times higher by three years.[18]

Neovascularisation of iris occurs in 1% to 17% of eyes of diabetic retinopathy. This rate is particularly higher for proliferative diabetic retinopathy.[19][20]

Ocular ischemic syndrome (OIS) is commonly unilateral, with 20% of cases being bilateral. Global ischemia causes both anterior segment and posterior segment neovascularization in OIS. Severe carotid artery occlusion and diabetic retinopathy are usually associated with OIS.[21]

Table-1. Disorders predisposing to neovascularisation of the iris and Angle

Ocular diseases
- CRVO
- CRAO
- BRVO
- BRAO
- Sturge weber syndrome
- Sickle cell retinopathy

Assorted ocular disease
- Retinal detachment
- Eale's disease
- Coats disease
- Retinopathy of Prematurity

Extraocular diseases
- Carotid artery disease
- Ocular ischemia
- Aortic arch syndrome
- Carotid cavernous fistula
- Pulseless disease

Ocular inflammatory disease
- Chronic uveitis
- Endophthalmitis
- Sympathetic ophthalmitis

Ocular therapy
- Cataract extraction in DM

Pathophysiology of Neovascular Glaucoma

The pathogenesis of NVG is outlined in the flow chart [figure 1]. The primary event is a condition leading to retinal hypoxia and ischemia which disrupts the balance between pro- and anti-angiogenic factors and thereby stimulates angiogenesis. Common angiogenic factors are vascular endothelial growth factors (VEGFs), hepatocyte growth factor, insulin-like growth factor, tumour necrosis factor, and inflammatory cytokines (especially IL-6). Common antiangiogenic factors are pigment epithelium-derived factor, transforming growth factor-beta (TGF-β), thrombospondin, and somatostatin.[22][23][24][25] VEGF, produced by a variety of cells in the retina (Muller cells, retinal pigment epithelium, pericytes, and ganglion cells) as well as the nonpigmented ciliary epithelium, is the major inciting factor implicated in the disease process.[26] VEGF is a vaso-permeability factor and a strong endothelial cell mitogen. It induces endothelial cell migration by expression of α/β integrins.[27] In addition to cell migration, VEGF increases the leucocyte adhesion at the endothelium resulting in breakdown of bloodretinal barrier.[22][23] TGF-β stimulates the formation of the fibrovascular membrane and fibroblast proliferation. The secondary event is the growth of new leaky vessels in the anterior chamber obstructing the trabecular meshwork. This leads to a rise in IOP and can rapidly progress to glaucomatous optic neuropathy with irreversible blindness, if not managed on time. It is also postulated that oxygen from the aqueous humour diffuses posteriorly to the hypoxic retina, thereby causing iris hypoxia. Consequently, the nonpigmented ciliary epithelium becomes an important site of VEGF synthesis.[22] This could explain the high risk of rubeosis in cases of NVG after surgeries like vitrectomy and lens extraction, in which the oxygen can easily reach the ischemic retina through diffusion and lead to rapid and severe iris hypoxia.

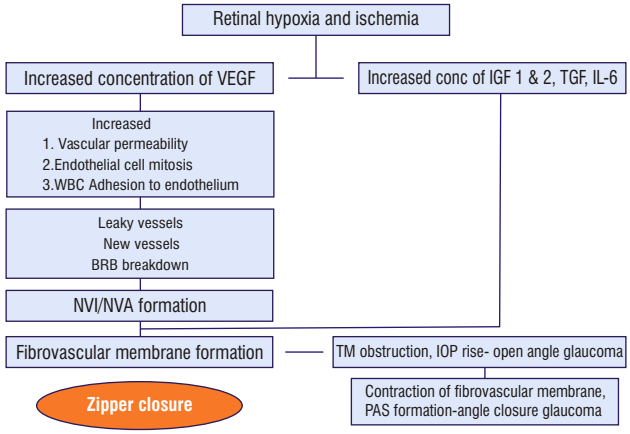


Figure 1. Flow chart showing pathophysiology of Neovascular Glaucoma

Histopathology

Histologically, new blood vessels are seen over the surface of the iris and rarely on the iris stroma. These blood vessels are formed due to the budding of endothelial cells from the capillaries. These vessels arise from the vessels over the root of the iris or from the major arterial circle. These vessels are devoid of a muscular layer and have little adventitial tissue.

The fibrovascular membrane is composed of myofibroblast and proliferating smooth muscle tissue and can extend over the surface of the iris and angle of the anterior chamber.[28][29]

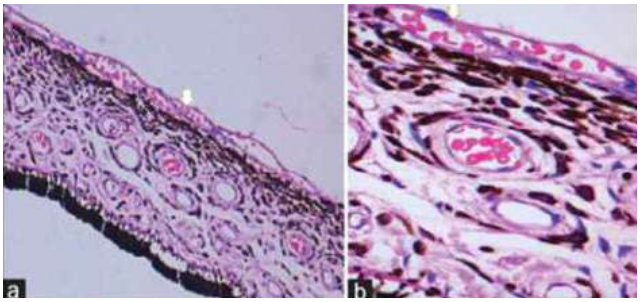


Figure2. Histopathology shows blood vessel formation on the anterior surface of iris (white arrow) composed of single-layered endothelial cells and lumen is filled with RBCs a.) H and E,10X, b.) H and E 40X

Clinical presentation

Symptoms

An eye with NVG is typically a chronic, painful, and red eye. Sometimes the intensity of pain and redness may be less pronounced, particularly in young patients with good endothelial reserve. Light sensitivity and blurry vision may be the initial symptoms in some patients.

Signs

The intraocular pressure in the eyes with NVG is high, often more than 50 mm Hg. Corneal edema may or may not be present. The hallmark signs of NVG on anterior segment examination are neovascularization of iris (NVI) and neovascularization of angle (NVA). The earliest detection of NVI can be done by the leakage of dye noticed after intravenous injection of fluorescein dye. The NVI appears as fine; new blood vessels typically present at the border of the pupillary margin. Sometimes, these vessels can be found at the margin of the iridotomy. These vessels can be differentiated from the normal vessels originating from the ciliary body present over the iris. The latter originates from the root of the iris, travels towards the pupillary border, and disappears in the iris stroma midway. NVA is a finding of gonioscopy. NVA appears as thin vessels over the trabecular meshwork crossing the scleral spur. Though isolated NVA without NVI is rare, sometimes NVA can be found prior to developing clinically detectable NVI.[30]

In advanced cases, there would be ectropion uveae at pupillary margin with attenuation of normal iris pattern due to growth of fibrovascular membrane. The clinical stages of NVG and classification of NVI and NVA are shown in Tables (2.)

Table (2.) : The clinical stages of neovascular glaucoma

Stage	Pre- rubeosis	Rubeosis iridis	Secondary open-angle glaucoma	Secondary angle-closure glaucoma
Clinical features	-Related to underlying retinal ischemic condition -Clinically Aymptomatic	Tiny tufts of new vessels appear first at the pupillary margin and less commonly at the angle which cross the SS to arborize over the TM New vessels grow over iris surface in an irregular fashion	Development of a fibrovascular membrane on anterior surface of the iris and angle of anterior chamber, blocks the TM, and obstructs aqueous outflow in an open-angle manner	Contracture of fibrovascular membrane pulls the iris over the TM forming PAS
NVI	NVI clinically not seen	Present	Prominent	Prominent with ectropion uveae
Gonioscopy	Open angles	Open angles, NVA with or without NVI may be present	Open angles, NVA may or may not be visible	Closed angles, NVA usually not visible
IOP	Normal	Normal	Raised	Raised
Prognosis	Good	Good	Good with timely intervention	Guarded

[IOP=Intraocular pressure, NVA=New vessels of the angle, NVI=New vessels of the iris, PAS=Peripheral anterior synechiae, TM=Trabecular meshwork]

Table(3.): Weis and Gold classification of NVI

Grade 1	NV at pupillary border < 2 quadrants
Grade 2	NV at pupillary border > 2 quadrants
Grade 3	NV at ciliary zone and /or ectropion uveae 1-3 quadrants
Grade 4	NV at ciliary zone and /or ectropion uveae >/= 3 quadrants

Table(4) : Weiss and Gold classification for NVA

Grade 1	New vessels cross SS and ramify over TM <2 quadrant
Grade 2	New vessels cross and ramify over TM >2 quadrants
Grade 3	New vessels at TM and PAS 1-3 quadrants
Grade 4	PAS >/- 3 quadrants

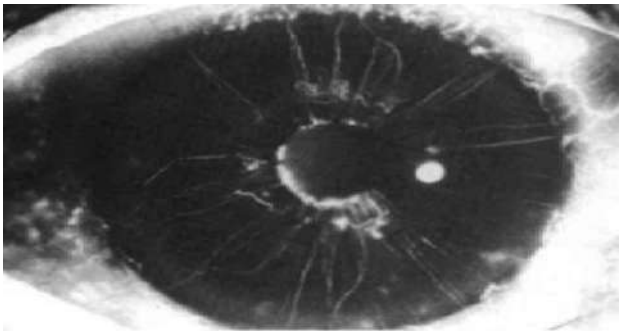


Figure 3. showing increased permeability of blood vessels at pupillary margin in pre- rubeosis stage

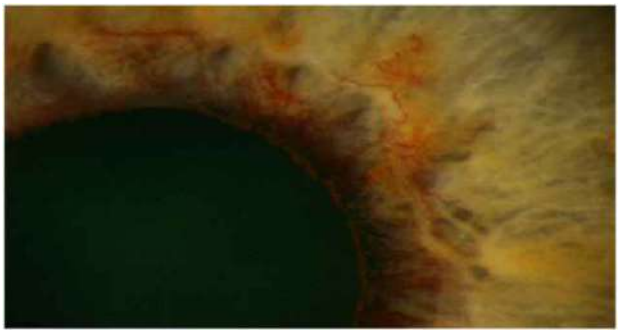


Figure 4. Dilated tufts of pre-existing capillaries and randomly oriented vessels on the surface of the iris near the pupillary margin in rubeosis iridis stage

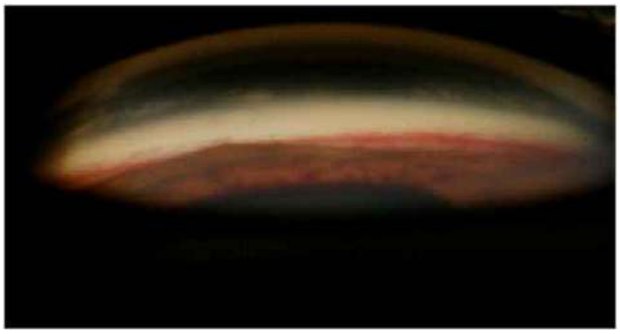


Figure 5. Gonioscopy showing neovascularisation of stage

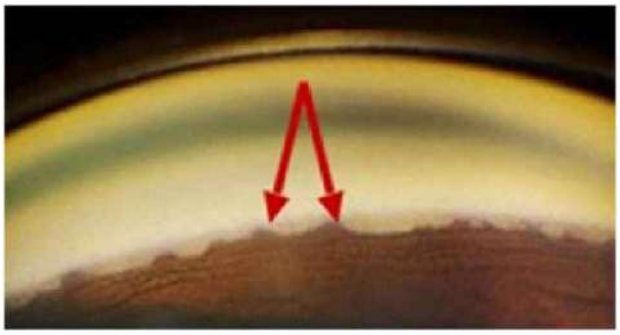


Figure 6. Gonioscopy showing peripheral anterior synachae

Evaluation

Investigations into the diagnosis of NVG can be broadly categorized as Ophthalmic investigations and systemic investigations.

Ophthalmic Investigations

Slit-lamp biomicroscopy : Slit-lamp biomicroscopy is indispensable for detecting NVI and NVA during the workup of a patient with NVG. The fine new vessels can be found over the iris surface, mainly near the pupillary margin. Sometimes, peripheral anterior synechae can be found in the eyes with NVI. Red blood cells can sometimes be seen in the anterior chamber.

Gonioscopy: This is a dynamic investigation, preferably done in an undilated pupil. New blood vessels can be found in the angle of the anterior chamber, over the trabecular meshwork crossing the scleral spur.

Fundus Fluorescein Angiography (FFA) of the retina and iris: Fundus fluorescein angiography is an invasive test to detect the neovascularization of the optic disc (NVD) neovascularization elsewhere (NVE), and areas of capillary nonperfusion (CNP). The former two are hyperfluorescent lesions, and the latter is a hyperfluorescent area. Recent advancements of ultra-wide-field FFA can capture the retinal image up to a 200-degree area of the retina, thus identifying the peripheral lesions like NVE and CNP areas better than conventional FFA.[31]

Optical coherence tomography angiography (OCTA) of the retina : OCTA of the retina is a rapid, non-invasive modality for diagnosing NVD, NVE, and CNP areas. Wide-field OCTA can capture 12□×□12-mm fovea-centered images.[32] OCTA can also be used to monitor disease status over subsequent visits.

OCTA of iris : Neovascularization of the iris can also be detected using OCTA.

B-scan ultrasound for posterior segment examination : Ultrasonography B scan is helpful in the detection of lesions of the posterior segment of the eyes in certain conditions. B scan can detect the presence of vitreous haemorrhage and additional fibrous proliferation, tractional or rhegmatogenous retinal detachment. Mass lesions like choroidal melanoma, ciliary body melanoma, and retinoblastoma can be detected. B Scan can detect retinal detachment in the advanced stages of ROP with NVG.

Systemic Investigations

Various systemic diseases can be associated with a case of NVG, and these depend upon the specific etiology causing NVG. The investigations for various systemic diseases are as follows:

1. Hypertension (associated with retinal venous and arterial occlusion): Blood pressure
2. Diabetes (can cause retinal veinous and arterial occlusion, PDR): Blood sugar levels, HbA1c
3. Hyperlipidemia (can cause retinal veinous and arterial occlusion): Lipid profile
4. OIS : carotid doppler, magnetic resonance angiography
5. Uveitis: HLA B-27 assay, treponema serology, Tuberculosis testing (QuantiFERON-TB Gold, Mantoux), Sarcoidosis (ACE, chest X-ray)
6. Blood dyscrasia: Complete blood counts, ESR, CRP, Plasma electrophoresis, specific testing for hyperviscosity syndromes.

Management of Neovascular Glaucoma

Treatment principle catagorized into-

1.Treatment of primary disease which causes retinal ischemia.
2. Control IOP
3.Treatment of underlying systemic disease (DM, HTN, carotid artery obstruction)
4. Control inflammation

Identifying and managing the etiological factors (as described under the section of etiology) and investigations related to those factors (as described under the section of systemic investigations) are crucial in curtailing the ongoing mechanism of retinal ischemia. This also prevents the contralateral eye from developing NVG in the patients with unilateral NVG at presentation. Patients with uncontrolled diabetes, hypertension, hyperlipidemia, and nephropathy should be managed with the help of a physician.

Treatment of underlying retinal ischemia

is comprised of pan-retinal photocoagulation (PRP) and intravitreal anti-VEGF injections.

PRP does not immediately reduce neovascularization but has a longer treatment effect when compared to anti-VEGF injections. As a result, a combination of these treatments is often given initially. Typical settings of PRP include spot size of 400 to 500 microns, laser burns spaced one burn-width apart, grade 3 laser burns, and 1200 to 1600 burns per sitting, if planned in 2 sittings. Usually, the PRP is completed in 2 or 3 sittings, separated five days apart. However, the presence of media haze, including corneal edema due to raised IOP, cataract, and vitreous haemorrhage, precludes the delivery of PRP.

The presence of corneal edema may necessitate intravitreal injection of anti-VEGF agents along with topical and systemic antiglaucoma medications to reduce the IOP and hence improve the corneal clarity, after which PRP can be performed. In the presence of cataracts obscuring the view to the fundus, intravitreal injection of anti-VEGF agents is required to reduce the NVI and NVA. Additionally, topical and systemic antiglaucoma medications need to be used to reduce the IOP. After the start of regression of anterior segment neovascularization and decrease in IOP, cataract surgery can then be performed. In the presence of vitreous haemorrhage, intravitreal injection of anti-VEGF agents along with topical and systemic antiglaucoma medications should be started immediately and pars plana vitrectomy considered as soon as feasible. Intravitreal injections are useful in decreasing the VEGF drive in the retina of the eyes with NVG and are very important in managing retinal ischemia.

Intraocular pressure management often requires both topical and systemic medications initially, and ultimately surgical management is often necessary. Topical beta-blockers, alpha agonists, and carbonic anhydrase inhibitors are frequently used in the management of IOP in eyes with NVG. Prostaglandin analogs can increase inflammation but are still often used as maximum medical treatment may be necessary. Systemic carbonic anhydrase inhibitors are also useful in the short-term management of IOP but must be used cautiously in patients with renal impairment. Surgical management of IOP is indicated where the maximal medical management fails to control the IOP. Surgical management of high IOP in the eyes with NVG includes trabeculectomy or glaucoma drainage device. Though trabeculectomy is less preferred in eyes with NVG due to their high failure rate, there are some studies describing improved success rates of trabeculectomy augmented by anti-metabolites such as mitomycin C (MMC) or 5-Fluorouracil.[33]

In one study, the success rate after trabeculectomy with MMC was reported to be 62% at the end of 1 year post-operatively; however, this decreased to 51.7% at the end of 5 years. Preoperative intravitreal anti-VEGF agents have been shown to reduce the failure rate of trabeculectomy in the eyes with NVG.[34]

While there is no consensus regarding the surgical approach to NVG, recent studies suggest early implantation of GDD for the successful management of NVG.[35] In one study by Noor N A et al., GDD combined with intravitreal bevacizumab could maintain better visual acuity in comparison to GDD alone at the end of 3 years post-surgery. However, there was no significant difference in the final surgical success rate.[36]

Transscleral cyclophotocoagulation (TSCPC) is also a surgical treatment option, particularly for eyes with poor visual potential and IOP elevation refractory to medical treatments.

Eyes with NVG often have associated inflammation, especially in the acute phase, which can be treated with topical corticosteroid eye drops. Prednisolone acetate 1% can be used in tapered doses.

The pain and discomfort due to cyclospasm in the eyes with NVG can be mitigated with the help of cycloplegic eye drops such as atropine or cyclopentolate.

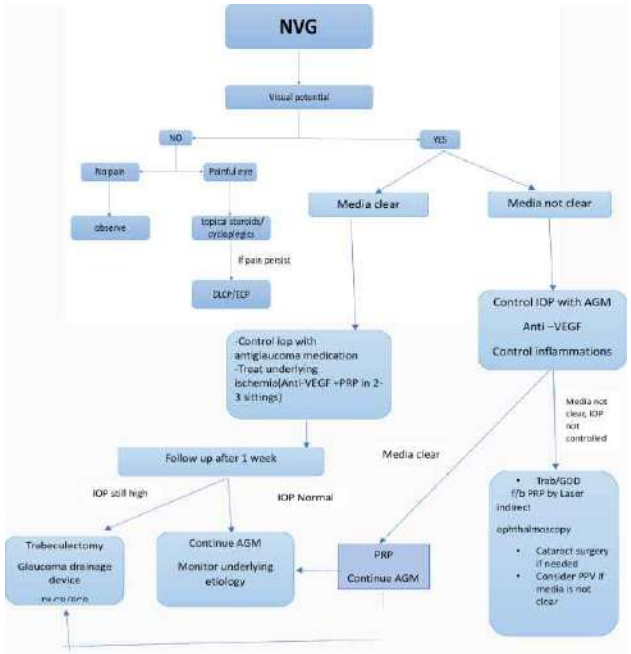


Figure 7. Flow chart showing treatment of neaovascular glaucoma. NVG- neovascular Glaucoma, AGM- Anti glaucoma medications, DLCP- Diode Laser Cyclophotocoagulaation, ECP- endoscopic cyclophotocoagulation, PRP- pan retinal photocoagulation, GDD- Glaucoma Drainage device

Complications after glaucoma surgery in eyes with neovascular glaucoma

In view of complex pathology in NVG, ongoing inflammation and new vessels in the eye, and surgical interventions like trabeculectomy and GDD are associated with various complications. Most common complication is hyphaema that ranges from 4%[37]to 85%[38].The incidence of hyphaema can be reduced by cauterizing iris before iridectomy, preoperative IVB to reduce NVI, and avoiding intraoperative and postoperative hypotony. Other complications include anterior chamber shallowing up to 30%,[38] and serous choroidal detachment up to 20%.[39] Late complications like bleb leak with mitomycin C trabeculectomy have been reported in up to 13% eyes.[40] Two serious complications in these eyes are persistent hypotony reported up to 16.7%[41] and suprachoroidal hemorrhage up to 5% of eyes.[38]

GDD in NVG has good IOP control; however, long-term complications can be serious. Microangiopathy and ischemia predispose eyes with GDD to complications like conjunctival erosion and tube exposure in up to 12.5% eyes. Contraction of fibrovascular membrane results in tube occlusion and tube corneal touch may present in 3% to 14% eyes. [42]

Progonosis

NVG carries a guarded prognosis. Prognosis is predominantly dependent on two factors: prevention and treatment of NVG early in its course and the underlying disease process. Intensity and frequency of follow-up depend on the etiology of NVG and the clinical course. In subjects with ischemic CRVO, it calls for a 24 weekly review with a detailed evaluation including undilated gonioscopy to detect early angle new vessels that could occur in 612% of eyes with CRVO without NVI.

Patient education and enhancing healthcare outcome

NVG is a potentially blinding disease and is an ophthalmic emergency. Early diagnosis and multidisciplinary systematic approach would be needed to salvage useful vision in these eyes. Timely and appropriate treatment of underlying cause of ischemia and controlling the IOP are the keys to successful management of this condition.

Several systemic diseases can result in NVG. Diseases such as diabetes, hypertension, hyperlipidemia, and blood dyscrasias require management by an physician. However, the ophthalmologist may alert the physician and patient regarding the need for improved control of their systemic disease. The presence of carotid artery obstruction in ocular ischemic syndrome requires prompt evaluation by an interventional cardiologist or endovascular surgeon.

The presence of systemic or ocular malignancies may require treatment coordinated through an oncologist. The assistance of a caregiver or patient advocate is often helpful in ensuring treatment compliance and follow-up of the ocular and systemic conditions associated with NVG. Thus, for optimal outcomes of NVG, the coordination between different sub-specialties is to be emphasized rather than isolated ophthalmic care.

References

1. Rodrigues GB, Abe RY, Zangalli C, Sodre SL, Donini FA, Costa DC, Leite A, Felix JP, Torigoe M, Diniz-Filho A, de Almeida HG. Neovascular glaucoma: a review. Int J Retina Vitreous. 2016;2:26.
2. Senthil S, Dada T, Das T, Kaushik S, Puthuran GV, Philip R, Rani PK, Rao H, Singla S, Vijaya L. Neovascular glaucoma - A review. Indian J Ophthalmol. 2021 Mar;69(3):525-534.
3. Yang H, Yu X, Sun X. Neovascular glaucoma: Handling in the future. Taiwan J Ophthalmol. 2018 Apr-Jun;8(2):60-66.
4. Sivak-Callcott JA, O'Day DM, Gass JD, Tsai JC. Evidence-based recommendations for the diagnosis and treatment of neovascular glaucoma. Ophthalmology. 2001 Oct;108(10):1767-76; quiz1777, 1800.
5.Ohrt V. The frequency of rubeosis iridis in diabetic patients. Acta Ophthalmol (Copenh). 1971;49(2):301-7.
6. Weiss di, shaffer rn, nehrenberg tr. Neovascular gluacoma complicating carotid-cavernous fistula. Arch Ophthalmol. 1963 Mar;69:304-7.
7. Narayanaswamy A, Baskaran M, Zheng Y, Lavanya R, Wu R, Wong WL, et al. The prevalence and types of glaucoma in an urban Indian population: The Singapore Indian Eye Study. Invest Ophthalmol Vis Sci. 2013;54:46217.
8. Paul C, Sengupta S, Choudhury S, Banerjee S, Sleath BL. Prevalence of glaucoma in Eastern India: The Hooghly River glaucoma study. Indian J Ophthalmol. 2016;64:57883.
9. OHRT V. The frequency of rubeosis iridis in diabetic patients. Acta Ophthalmol. 1971;49:3017.
10. Mocanu C, Barascu D, Marinescu F, Lacrateanu M, Iliusi F, Simionescu C. Neovascular glaucoma--retrospective study. Oftalmologia (Bucharest, Romania: 1990) 2005;49:5865.
11.Liao N, Li C, Jiang H, Fang A, Zhou S, Wang Q. Neovascular glaucoma: a retrospective review from a tertiary center in China. BMC Ophthalmol. 2016 Jan 27;16:14.
12. Hayreh SS. Neovascular glaucoma. Prog Retin Eye Res. 2007;26:47085.
13. Luo J, Yan Z, Jia Y, Luo R. Clinical analysis of 42 cases of ocular ischemic syndrome? J Ophthalmol. 2018;2018:2606147.
14. Shazly TA, Latina MA. Neovascular glaucoma: Etiology, diagnosis and prognosis. Paper presented at: Seminars in ophthalmology. 2009
15. Brown GC, Magargal LE, Schachat A, Shah H. Neovascular glaucoma: Etiologic considerations. Ophthalmology. 1984;91:31520.
16. Barac IR, Pop MD, Gheorghe AI, Taban C. Neovascular secondary glaucoma, etiology and pathogenesis. Rom J Ophthalmol. 2015;59:248.
17. OHRT V. The frequency of rubeosis iridis in diabetic patients. Acta Ophthalmol. 1971;49:3017.
18.Baseline and early natural history report. The Central Vein Occlusion Study. Arch Ophthalmol. 1993 Aug;111(8):1087-95.
19.Hayreh SS, Rojas P, Podhajsky P, Montague P, Woolson RF. Ocular neovascularization with retinal vascular occlusion-III. Incidence of ocular neovascularization with retinal vein occlusion. Ophthalmology. 1983 May;90(5):488-506
20.Armaly MF, Baloglou PJ. Diabetes mellitus and the eye. 1. Changes in the anterior segment. Arch Ophthalmol. 1967 Apr;77(4):485-92.
21.Luo J, Yan Z, Jia Y, Luo R. Clinical Analysis of 42 Cases of Ocular Ischemic Syndrome. J Ophthalmol. 2018;2018:2606147.
22. Chalam KV, Brar VS, Murthy RK. Human ciliary epithelium as a source of synthesis and secretion of vascular endothelial growth factor in neovascular glaucoma. JAMA Ophthalmol. 2014;132:13504.
23. Tolentino MJ, Miller JW, Gragoudas ES, Chatzistefanou K, Ferrara N, Adamis AP. Vascular endothelial growth factor is sufficient to produce iris neovascularization and neovascular glaucoma in a nonhuman primate. Arch Ophthalmol. 1996;114:96470.
24. Yu XB, Sun XH, Dahan E, Guo WY, Qian SH, Meng FR, et al. Increased levels of transforming growth factor-beta1 and-beta2 in the aqueous humor of patients with neovascular glaucoma. Ophthalmic Surg Lasers Imaging Retina. 2007;38:614.
25. Chen K-H, Wu C-C, Roy S, Lee S-M, Liu J-H. Increased interleukin-6 in aqueous humor of neovascular glaucoma. Invest Ophthalmol Vis Sci. 1999;40:262732.
26. Aiello LP, Avery RL, Arrigg PG, Keyt BA, Jampel HD, Shah ST, et al. Vascular endothelial growth factor in ocular fluid of patients with diabetic retinopathy and other retinal disorders. New Engl J Med. 1994;331:14807.
27. Senger DR, Perruzzi CA, Streit M, Koteliansky VE, de Fougerolles AR, Detmar M. The α1β 1 and α2β 1 integrins provide critical support for vascular endothelial growth factor signaling, endothelial cell migration, and tumor angiogenesis. Am J Pathol. 2002;160:195204.
28.Gartner S, Henkind P. Neovascularization of the iris (rubeosis iridis). Surv Ophthalmol. 1978 Mar-Apr;22(5):291-312.
29.John T, Sassani JW, Eagle RC. The myofibroblastic component of rubeosis iridis. Ophthalmology. 1983 Jun;90(6):721-8.
30. Azad R, Arora T, Sihota R, Chandra P, Mahajan D, Sain S, Sharma Y. Retcam fluorescein gonioangiography: a new modality for early detection of angle neovascularization in diabetic retinopathy. Retina. 2013 Oct;33(9):1902-7
31. Kumar V, Surve A, Kumawat D, Takkar B, Azad S, Chawla R, Shroff D, Arora A, Singh R, Venkatesh P. Ultra-wide field retinal imaging: A wider clinical perspective. Indian J Ophthalmol. 2021 Apr;69(4):824-835.
32. Tan B, Chua J, Lin E, Cheng J, Gan A, Yao X, Wong DWK, Sabanayagam C, Wong D, Chan CM, Wong TY, Schmetterer L, Tan GS. Quantitative Microvascular Analysis With Wide-Field Optical Coherence Tomography Angiography in Eyes With Diabetic Retinopathy. JAMA Netw Open. 2020 Jan 03;3(1):e1919469.
33. Takihara Y, Inatani M, Fukushima M, Iwao K, Iwao M, Tanihara H. Trabeculectomy with mitomycin C for neovascular glaucoma: prognostic factors for surgical failure. Am J Ophthalmol. 2009 May;147(5):912-8, 918.e1.
34. Saito Y, Higashide T, Takeda H, Ohkubo S, Sugiyama K. Beneficial effects of preoperative intravitreal bevacizumab on trabeculectomy outcomes in neovascular glaucoma. Acta Ophthalmol. 2010 Feb;88(1):96-102.
35. Gnanavelu S, Puthuran GV, Chiranjeevi KP, Wijesinghe HK, Reddy V, Mani I, Krishnadas SR, Gedde SJ. Intermediate-term outcomes of the Aurolab aqueous drainage implant in neovascular glaucoma. Br J Ophthalmol. 2023 Mar;107(3):355-360.
36. Noor NA, Mustafa S, Artini W. Glaucoma drainage device implantation with adjunctive intravitreal bevacizumab in neovascular glaucoma: 3-year experience. Clin Ophthalmol. 2017;11:1417-1422.
37. Zhou M-W, Wei W, Huang W-b, Chen S-d, Li X-Y, Gao X-B, et al. Adjunctive with versus without intravitreal bevacizumab injection before Ahmed glaucoma valve implantation in the treatment of neovascular glaucoma. Chin Med J. 2013;126:14127.
38. Mahdy RA, Nada WM, Fawzy KM, Alnashar HY, Almosalamy SM. Efficacy of intravitreal bevacizumab with panretinal photocoagulation followed by Ahmed valve implantation in neovascular glaucoma. J Glaucoma. 2013;22:76872.
39. Arcieri ES, Paula JS, Jorge R, Barella KA, Arcieri RS, Secches DJ, et al. Efficacy and safety of intravitreal bevacizumab in eyes with neovascular glaucoma undergoing Ahmed glaucoma valve implantation: 2-year follow-up. Acta Ophthalmol. 2015;93:e16.
40. Higashide T, Ohkubo S, Sugiyama K. Long-term outcomes and prognostic factors of trabeculectomy following intraocular bevacizumab injection for neovascular glaucoma. PLoS One. 2015;10:e0135766.

41. Takihara Y, Inatani M, Kawaji T, Fukushima M, Iwao K, Iwao M, et al. Combined intravitreal bevacizumab and trabeculectomy with mitomycin C versus trabeculectomy with mitomycin C alone for neovascular glaucoma. J Glaucoma. 2011;20:196201.
42. Ma KT, Yang JY, Kim JH, Kim NR, Hong S, Lee ES, et al. Surgical results of Ahmed valve implantation with intraoperative bevacizumab injection in patients with neovascular glaucoma. J Glaucoma. 2012;21:3316.

Author
Dr. Jaishree Singh
MS Ophthalmology
Senior professor and HOD
GMC, Kota

Author
Dr. Anita Rani
PG IInd year Resident
GMC, Kota

Subluxated Soemmering's ring

Author : Dr Prateek Jain, Consultant, Global hospital institute of ophthalmology, Abu Road.

An 57-year-old male underwent manual small incision cataract surgery 12-years back and presented with progressive diminution of vision in right eye (RE). Post-mydriasis slit-lamp-examination of RE revealed subluxated Soemmering's Ring (SR) with stretched zonules, capsular phimosis and partially prolapsed polymethyl methacrylate(PMMA) intraocular lens(IOL) having superior haptic present in the bag. Patient had uncorrected visual acuity of 6/36 which improved to 6/9 after refraction. There was no history of ocular trauma. Systemic history was insignificant.

This unique ophthalmic image depicts simultaneous presence of subluxated Soemmering's ring with partial dislocated rigid PMMA IOL. Surprisingly, no vitreous prolapse was noted. Inferior haptic and prolapsed optic of IOL was found resting stable on the cushion of stretched zonules. Specular counts and Intra Ocular pressure(IOP) were with in normal limit. Fundus examination was unremarkable. Patient was prescribed glasses and asked for 6 monthly follow up to look for any corneal decompensation and IOP rise.

Soemmering first observed posterior capsule opacification in 1928 and described SR as deposits of retained equatorial lens epithelial cells which continue to proliferate and form new cortical fibers which eventually form a ring of cortical fibers between the posterior capsule and the edges of the anterior capsule remnant.[1,2] The fusion between the anterior capsule and the posterior capsule protects the cells from the lytic aqueous humor. Hence, SR remains unharmed. (3) The SR usually remains invisible lying behind the iris in the equator of the retro-lental space and being held in position by the zonules. It can be therefore seen only after dilating the pupil. As the central portion of the ring remains clear, there is no visual disturbance as a rule. (4) But in this case, SR being subluxated was visible in undilated state and was responsible for the visual disturbance.

According to Poos, the factors favouring dislocation of the SR are progressive myopia and ocular trauma which were absent in this patient. [4] Probably, it is spontaneous subluxation of SR secondary to capsular phimosis.

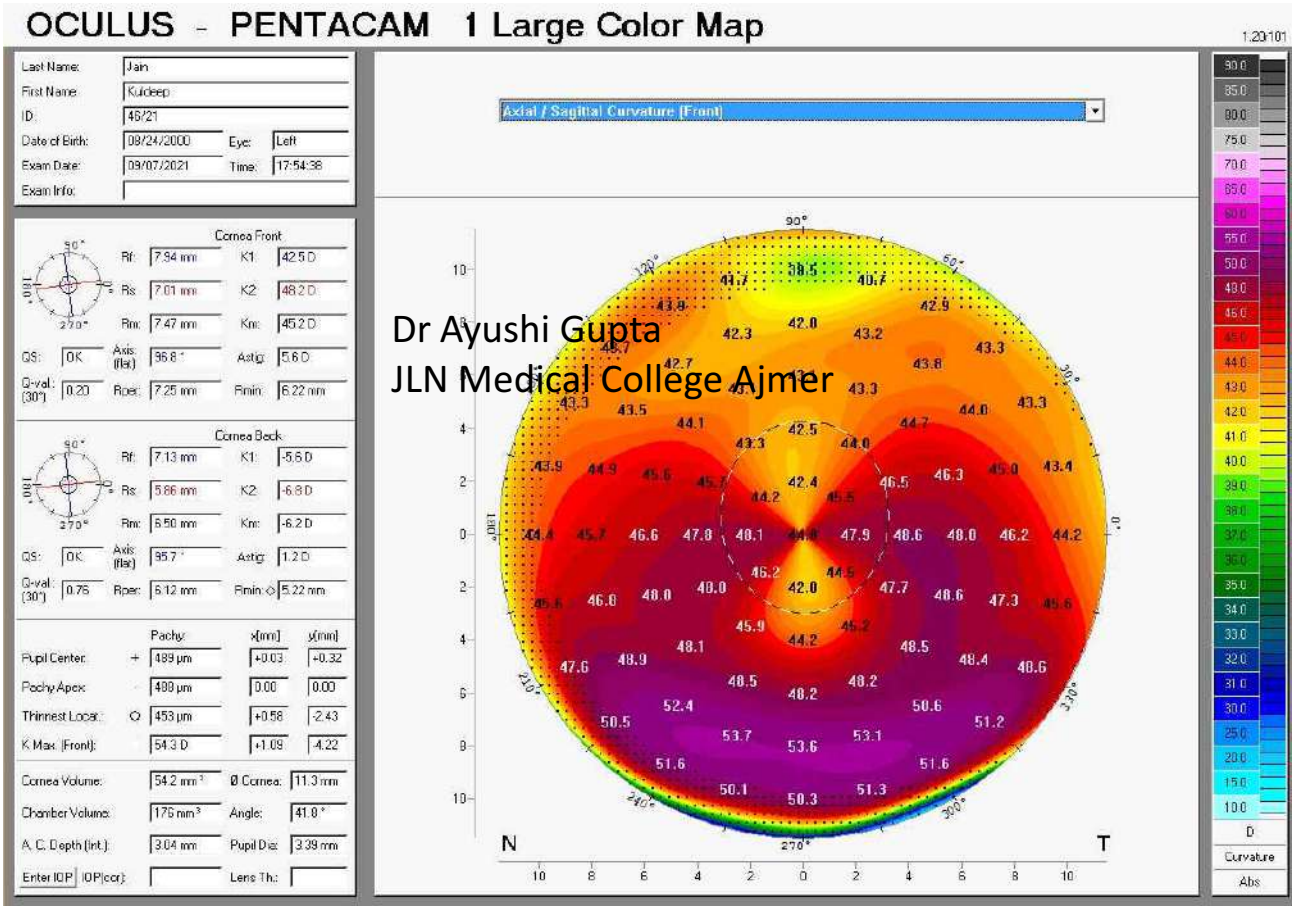
Fig 1: Slit lamp image of Subluxated Soemmerings Ring with illustration about associated findings.

References

1.Tooke FT. Dislocation of the ring of soemmering, its removal, with some notes on its pathology Trans Am Ophthalmol Soc. 1933;31:68–76
2. Akal A, Göncü T, Yuvaci I, Pangal E, Cakmak S. Pupil occlusion due to a large dislocated Soemmering ring in an aphakic eye Int Ophthalmol. 2014;34:121–4
3.Guha GS. Soemmering□s ring and its dislocations. Br J Ophthalmol 1951; 35: 226-231
4.Guha G S. After-cataract, soemmering's ring and its dislocation. Indian J Ophthalmol 1962;10:39-44

"BEWARE OF THE CLAW "

Dr Ayushi Gupta
JLN Medical College, Ajmer



The importance of posterior segment screening and prophylaxis of retinal lesions before refractive surgery

Dr. Sanjeev Kumar Neiniwal MD, DNB, MNAMS[1]
Dr. Siddharth Maanju Ms[1] **Dr. Sandeep Parwal MD**[1]
1: Vitreo Retinal Services, Department of Ophthalmology, Sawai Man Singh Medical College & Hospital, Jaipur, (Raj.)

Abstract
There are no framed guidelines for screening of patients but a general screening protocol which one could follow has been shown in figure 1.Screening protocol before refractive surgery Screening ideally should be done by an experienced retina specialist as there is no substitute for an experienced doctor. Alternatively, an ultra-wide field fundus camera can be used to screen for peripheral retinal lesions. This modality has moderate sensitivity (about 57%) and high specificity (>99%) for screening of peripheral lesions.[8] Treatment Untreated patients who have peripheral lesions are at 10 times more risk of developing an RD than those who are administered prophylactic laser photocoagulation.[9] So it is prudent that treatment be taken up in patients having peripheral lesions that predispose to RD. These lesions according to review articles[9] are: (1) asymptomatic patients with peripheral lesions when monitoring is not possible (learning disability, living in remote area, etc.); (2) areas of retinal weakness if symptomatic/only-eye/retinal detachment in the fellow eye; (3) symptomatic breaks or persistent vitreoretinal traction; (4) operculated holes where vitreous is adherent to the hole margin; (5) horseshoe tears/giant tears/retinal dialysis. Or one could follow the Wilkinson CP recommendations for treatment (Table 1).

Recommendations
1) All symptomatic and asymptomatic horse-shoe tears, operculated holes, lattice degeneration with retinal holes, atrophic holes Treat promptly
2) All symptomatic lattice degeneration without retinal holes and atrophic holes Treatment is usually recommended
3) All asymptomatic lattice degeneration without retinal holes, pigmented lattice degeneration, and atrophic holes Can be observed
4) Eyes with atrophic holes or lattice degeneration where the fellow eye has already developed retinal detachment Can be considered for treatment
Table 1: Recommendations for treatment of peripheral retinal degenerations for patients undergoing refractive surgery It is also important to stress the fact that some studies[10] show a lack of efficacy for prophylactic treatment to areas of peripheral degeneration. But that is not the case, as it has been observed[11] that RDs that develop post-laser are not related to the previous lesions but to newer lesions that develop or a PVD that may theoretically induce a tear at the edge of a treated area.[4] Now after treatment with laser photocoagulation, the adhesive force of the retina reduces by 50% at 8 hours, but then it increases by 140% (beyond the normal) by 24 hours and becomes twice the normal between 3 days to 4 weeks.[12] Therefore, taking the patient for surgery at least 7 days post-photocoagulation is usually recommended.
Follow up It has been shown that the incidence of PVD post-surgery may vary from 2 days in 16% of cases and 85% within a month.[13] Also, in various studies[4] it was observed that most RDs occur around a period of about 11 months. Hence, even after a good surgery, the patient may experience an RD. As, myopic patients normally are at risk of vision-threatening complications such as macular hole, atrophy, choroidal neovascular membranes, and RDs regular follow-ups should be mandatory as a routine practice.

Conclusion
It is obvious that at times that the process of rigorous screening of every patient at a high-volume center may sometimes be a problem. But in the litigious world that we live in today, it is prudent to properly counsel and inform the patients about the risks of RD and symptoms of flashes and floaters for better treatment acceptance by the patient and timely treatment if needed for the best possible outcomes. At the end of this discussion, we would like to end with a real-world example: It has been reported that a myopic patient scheduled for LASIK cancelled her appointment a week ahead of time. The day after which she had been scheduled for LASIK, she contacted the doctor for a sudden reduction of vision in one eye. On examination, the eye had experienced retinal detachment.[14] If this patient presented to you and there was no proper retinal exam or patient counselling what would the consequences be? Hence, the relevance of this discussion is important.

References
1. Dolgin E. The myopia boom. Nature. 2015;519(7543):2768.
2. Pan CW, Ramamurthy D, Saw SM. Worldwide prevalence and risk factors for myopia. Ophthalmic Physiology and Optics. 2012;32(1):316.
3. Cheung N, Lee SY, Wong TY. Will the Myopia Epidemic Lead to a Retinal Detachment Epidemic in the Future? JAMA Ophthalmol. 2021;139(1):9394. doi:10.1001 /jamaophthalmol.2020.5112.
4. Srinivasan R, Jain S, Jaisankar D, Raman R. Incidence and risk factors for retinal detachment following laser-assisted in-situ keratomileusis. Indian J Ophthalmol 2021;69:1856-60.

5. Burton TC. The influence of refractive error and lattice degeneration on the incidence of retinal detachment. Trans Am Ophthalmol 1989;87:143-57.
6. Flaxel CJ, Young HC, Sheety M, et al. Proposed mechanism for retinal tears after LASIK; an experimental model. Ophthalmology 2004; 111:2427.
7. Ruiz-Moreno JM, Montero J, De la Vega C, et al. Retinal detachment in myopic eyes after phakic intraocular lens implantation. J Refract Surg. 2006;22:247-252.
8. Yang D, Li M, Wei R, Xu Y, Shang J, Zhou X. Optomap ultrawide field imaging for detecting peripheral retinal lesions in 1725 high myopic eyes before implantable collamer lens surgery. Clin Experiment Ophthalmol 2020. doi: 10.1111/ceo.13809.
9. Koshy Z. Prophylaxis of rhegmatogenous retinal detachment. Royal College of Ophthalmologists Focus Winter 2005; 36.
10. Byer NE. Lattice degeneration of the retina. Surv Ophthalmol 1979;23:213-48. 11. Arevalo JF, Ramirez E, Suarez E, Cortez R, Ramirez G, Yepez JB. Retinal detachment in myopic eyes after laser in situ keratomileusis. J Refract Surg 2002;18:708-14.12. Yoon YH, Marmor MF. Rapid enhancement of retinal adhesion by laser photocoagulation. Ophthalmology 1988;95:1385-8. 13. Osman MH, Khalil NM, El-Agha M-S. Incidence of posterior vitreous detachment after femtosecond LASIK compared with microkeratome LASIK. Cornea 2017;36:1036-9. 14. Mannis, M. J., & Holland, E. J. (2022). Cornea: Fundamentals, diagnosis, and Management. Elsevier.

"Retinopathy of Prematurity"

Dr Vipul Prajapati[1] Dr Arvind Chauhan[2] Dr. Dinesh K Yadav[2]
1 : M & J Institute of Ophthalmology, Ahemdabad
2 : SN Medical College, Jodhpur

Introduction

Retinopathy of prematurity (ROP) is a fibrovascular proliferative disorder that affects the development of peripheral retinal vasculature in pre-term and low birth weight babies. It continues to be a major cause of preventable childhood blindness all over the world. The initial signs are detectable by a few weeks after birth, and the condition progresses rapidly thereafter, suggesting a very narrow window of opportunity for treatment. Hence, timely detection and treatment are crucial to prevent the progression of disease to Stage 4 or 5 (when the prognosis is poor even after treatment). Out of 26 million annual live births in India, approximately 2 million are less than 2000 grams in weight and are at risk of developing ROP. The incidence of ROP in India is 38 - 51.9% in Low Birth Weight infants.

Pathogenesis

In a normal fetus, vascular development of the retina reaches the nasal periphery at 8 months of gestation and temporal periphery by 10 months of gestation. The vascular development of the retina occurs in two phases.

Phase 1 (True vasculogenesis): VEGF Independent

It occurs from 8-21 weeks of foetal development. Spindle cells (mesenchymal precursor cells) appear around the optic disc region. Then cords of spindle cells advance towards ora serrata which differentiate into capillaries which subsequently develop into arterioles and venules. Phase 1 is not under the control of Vascular Endothelial Growth Factor (VEGF).

Phase 2 (Angiogenesis): VEGF Dependant

It occurs from 22 to 40 weeks of development. Proliferating endothelial cells migrate from existing blood vessels to form new capillaries. Phase 2 is VEGF dependent. The fetus is in a hypoxic state in utero. As vascularisation is incomplete at birth in pre-term infants, and the infant is exposed to a hyperoxic state (outside environmental oxygen or supplemental oxygen provided in NICU), there is downregulation of VEGF. This causes vaso-obliteration and cessation of vessel growth, and the peripheral retina becomes avascular. This peripheral avascular retina stimulates a pathological release of VEGF in response to tissue hypoxia. This massive release of VEGF stimulates pathological neo-vascularisation and progression of ROP.

Risk Factors

Prematurity, low birth weight and supplemental oxygen administration are the most significant risk factors for ROP. Other risk factors are:

1. Multiple births
2. Concurrent illness
3. Anemia
4. Hyperglycemia
5. Frequent blood transfusion
6. Mechanical ventilation
7. Seizures
8. Apnea
9. Bradycardia
10. Intraventricular hemorrhage
11. Bacterial and fungal late onset sepsis
12. Light exposure

Classification

An international classification of ROP was published in 1984 and updated in 2005. The components of classification are as follows:
A. Location of disease: Each eye is divided into three zones to define the exact location.

• Zone I - circle, the radius of which extends from the disc to twice the distance from the disc to the fovea.

• Zone II extends from the edge of zone I peripherally to ora serrata nasal and equivalent area near the temporal equator.

• Zone III residual crescent of retina anterior to zone II temporally.
B. Extent of disease is specified by the number of clock hours of retina involved.

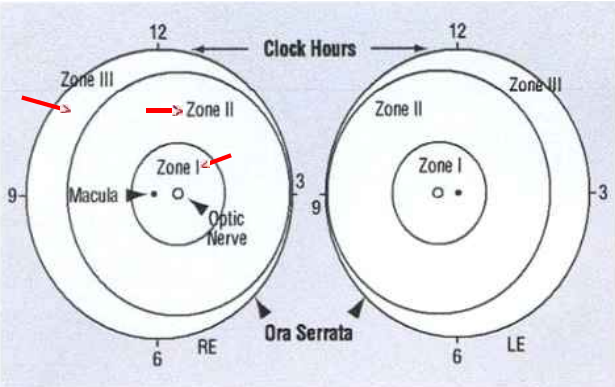


Figure 1: Depicts zone and extent of disease.

C. Staging of disease: It is done according to degree of vascular changes. Each stage is defined by its location in zone & extent in clock hours for documentation.

• Stage 1 Demarcation Line: This line is a thin but definite structure that separates the avascular retina anteriorly from the vascularized retina posteriorly. The demarcation line is relatively flat, white and lies within the plane of the retina.

• Stage 2 Ridge: The ridge is the hallmark of stage 2 ROP. It arises in the region of the demarcation line, has height and width, and extends above the plane of the retina.

• Stage 3 Extraretinal fibrovascular proliferation (EPF): EPF or neovascularization extends from the ridge into the vitreous. It is continuous with the posterior aspect of the ridge. It is further subdivided into mild, moderate or severe depending on the extent of EPF infiltrating the vitreous.

• Stage 4 Partial retinal detachment: Stage 4 is divided into partial retinal detachment not involving fovea, stage 4A and involving fovea, stage 4B. Visual prognosis of stage 4B is poorer than 4A.

• Stage 5 Total retinal detachment: These retinal detachments are generally tractional and visual prognosis is the worst for stage 5 ROP.

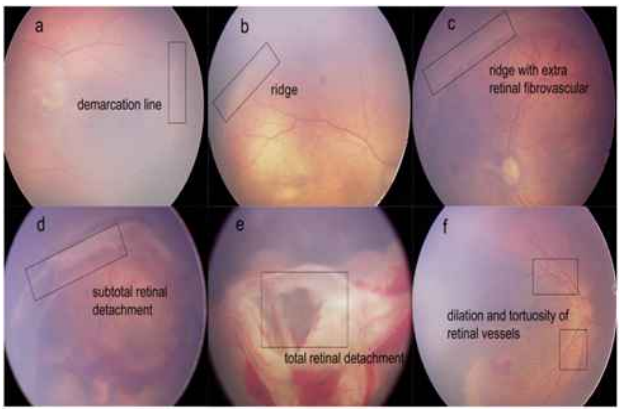


Figure 2 : Depicts staging of disease

Aggressive posterior ROP (AP-ROP

An uncommon, rapidly progressing, severe form of ROP is designated AP-ROP. If untreated, it usually progresses to stage 5 ROP. The characteristic features of AP-ROP are its posterior location, and prominence of plus disease, and it does not follow the stages mentioned above. It is observed most commonly in zone I but may also occur in posterior zone II.

Plus disease It is an additional sign indicating the severity of active ROP. This includes increased venous dilatation and arteriolar tortuosity of the posterior retinal vessels and may later increase in severity to include iris vascular engorgement, poor pupillary dilatation (rigid pupil), and vitreous haze.

Pre-plus disease It is defined as vascular abnormalities of the posterior pole that is insufficient for the diagnosis of plus disease but demonstrates more arterial tortuosity and more venous dilatation than normal.

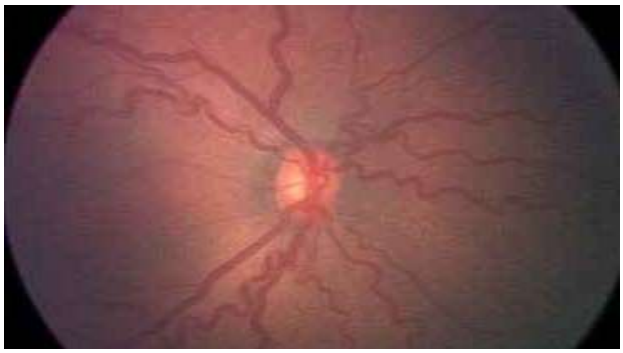


Figure 3: Depicts plus disease.

Screening of ROP

When to screen?

All babies who are at risk of ROP should be screened at 31 weeks post conceptional age or 4 weeks after birth, whichever is later.

Whom to screen?

Indian screening guidelines suggest screening of all infants who are-

1. Weighing less than 1750 grams
2. Less than 34 weeks of gestation
3. Birth weight greater than 1750 grams or greater than 34 weeks of gestation with additional risk factors like mechanical ventilation, prolonged oxygen therapy, hemodynamic instability or adverse respiratory or cardiac disease profile or sepsis.

How to screen?

The paediatrician calls the retinal specialist to NICU or refer the child to them at the end of the first month. The retinal specialist screens all the babies with the help of binocular indirect ophthalmoscope, 20 D or 28 D lens, scleral depressor and a pediatric speculum. 0.5% proparacaine eye drops are used for topical anaesthesia, and half-strength tropicamide (0.4%) plus phenylephrine (2.5%) eye drops are used for pupillary dilatation.

Figure 4: NICU screening of ROP

Recently, a new digital camera, RetCAM, is available for screening but is a very expensive tool. RetCAM is a digital camera for imaging the retina of infants. It is a mobile, self-contained system that can move easily around the hospital or office. It provides state-of-the art wide field paediatric retinal imaging (130 degrees). It has instant & accurate documentation, avoiding time-consuming retinal drawings. It is a very useful tool for explaining the infant's condition to the parents and getting their support for long-term follow-up.

Figure 5: RetCAM screening of ROP.

Management of ROP

Management of ROP includes initiation of early treatment in those with the signs of progressing disease.

Early Treatment ROP (ETROP) study has divided pre-threshold ROP into

- High-Risk Prethreshold or Type 1 ROP: It should be treated immediately. It is defined as
- Zone 1 any stage with plus disease or
- Zone 1 stage 3 without plus disease or
- Zone 2 stage 2 or 3 with plus disease.
- Low-Risk Prethreshold Disease or Type 2 ROP: These eyes should be considered for treatment only if they progress to type 1 or threshold ROP. It is defined as
- Zone 1 stage 1 or 2 without plus disease or
- Zone 2 stage 3 without the plus disease.
- Rationale of treatment: Vasoformative factors (VEGF) are produced anterior to the vascular area, which causes neovascularisation at the junction of a vascular and avascular area. The larger the avascular area, the more is the production of vasoformative factors, and more is the neovascularisation.

The principle is to ablate the ischemic peripheral avascular retina so that it stops the release of VEGF or reduces the VEGF in the vitreous cavity.

1. Cryotherapy It involves placing a cryoprobe on the sclera and giving multiple applications of cryo on the entire avascular retina anterior to the ridge. It requires general anaesthesia, has more local complications like severe lid edema, and for zone I cases, the cryoprobe cannot reach posteriorly because of the restriction caused by the conjunctival fornix.

2. Laser Photocoagulation It causes ablation of peripheral avascular retina through indirect laser delivery system [diode red (810 nm) or green laser (532 nm) laser. It causes less local inflammation. The main advantages are that it can be performed under topical anaesthesia, systemic and local complications are much less compared to cryotherapy, and it can be done as outpatient procedure and posterior retina in zone I cases can be treated easily. Long-term side effects are myopia and astigmatism.

Laser or cryotherapy can only be done till stage 3 ROP. Management of stages 4 and 5 is surgical, and the final outcome is very poor for these stages. Surgical options available are Scleral buckling, Lens sparing vitrectomy and lensectomy and vitrectomy.

Role of anti VEGF in ROPAnti- VEGF drugs (Bevacizumab and Ranibizumab) bind and block the VEGF and regress the abnormal blood vessels and allow the retina to undergo a more normal peripheral vascularisation. Anti-VEGF drugs have the advantage of bedside administration in NICU, and they show a rapid response with marked regression seen even on the next day. A 2 year follow-up data from the BEAT-ROP study shows that there is a decrease in the amount of myopia and astigmatism when compared with peripheral laser ablation. Following this landmark study, the use of anti-VEGF injections for management of APROP has increased worldwide.Anti-VEGF drugs can be used as monotherapy, combination or rescue therapy with laser and prior to vitreous surgery to reduce vascularization.

Conclusion

The treatment of ROP requires a quick and multidisciplinary approach by both paediatricians and retinal specialists. Making the parents understand the seriousness of disease ensures regular follow-up and fewer drops out to treatment.

Management of ROP

Management of ROP includes initiation of early treatment in those with the signs of progressing disease.

Early Treatment ROP (ETROP) study has divided pre-threshold ROP into

- High-Risk Prethreshold or Type 1 ROP: It should be treated immediately. It is defined as
- Zone 1 any stage with plus disease or
- Zone 1 stage 3 without plus disease or
- Zone 2 stage 2 or 3 with plus disease.
- Low-Risk Prethreshold Disease or Type 2 ROP: These eyes should be considered for treatment only if they progress to type 1 or threshold ROP. It is defined as
- Zone 1 stage 1 or 2 without plus disease or
- Zone 2 stage 3 without the plus disease.
- Rationale of treatment: Vasoformative factors (VEGF) are produced anterior to the vascular area, which causes neovascularisation at the junction of a vascular and avascular area. The larger the avascular area, the more is the production of vasoformative factors, and more is the neovascularisation.The principle is to ablate the ischemic peripheral avascular retina so that it stops the release of VEGF or reduces the VEGF in the vitreous cavity.

1. Cryotherapy: It involves placing a cryoprobe on the sclera and giving multiple applications of cryo on the entire avascular retina anterior to the ridge. It requires general anaesthesia, has more local complications like severe lid edema, and for zone I cases, the cryoprobe cannot reach posteriorly because of the restriction caused by the conjunctival fornix.

2. Laser Photocoagulation: It causes ablation of peripheral avascular retina through indirect laser delivery system [diode red (810 nm) or green laser (532 nm) laser. It causes less local inflammation. The main advantages are that it can be performed under topical anaesthesia, systemic and local complications are much less compared to cryotherapy, and it can be done as outpatient procedure and posterior retina in zone I cases can be treated easily. Long-term side effects are myopia and astigmatism.

Laser or cryotherapy can only be done till stage 3 ROP. Management of stages 4 and 5 is surgical, and the final outcome is very poor for these stages. Surgical options available are Scleral buckling, Lens sparing vitrectomy and lensectomy and vitrectomy.

Role of anti VEGF in ROP

Anti- VEGF drugs (Bevacizumab and Ranibizumab) bind and block the VEGF and regress the abnormal blood vessels and allow the retina to undergo a more normal peripheral vascularisation. Anti-VEGF drugs have the advantage of bedside administration in NICU, and they show a rapid response with marked regression seen even on the next day. A 2 year follow-up data from the BEAT-ROP study shows that there is a decrease in the amount of myopia and astigmatism when compared with peripheral laser ablation. Following this landmark study, the use of anti-VEGF injections for management of APROP has increased worldwide.Anti-VEGF drugs can be used as monotherapy, combination or rescue therapy with laser and prior to vitreous surgery to reduce vascularization.

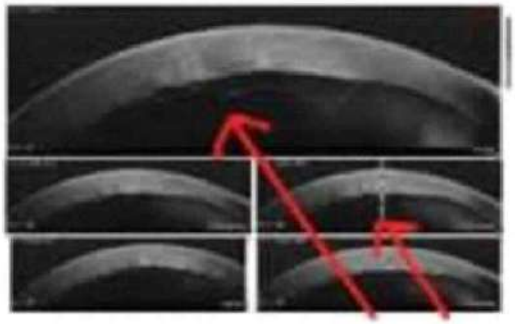
Conclusion

The treatment of ROP requires a quick and multidisciplinary approach by both paediatricians and retinal specialists. Making the parents understand the seriousness of disease ensures regular follow-up and fewer drops out to treatment.

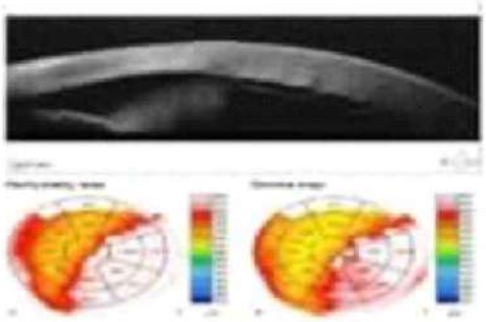
Dr Manish Joshi (MS)

Apna Netralaya Jodhpur, Rajasthan

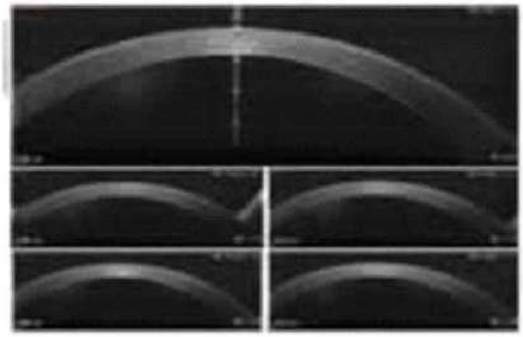
Title : Simple Procedure Great Result, Descement membrane detachment, Air bubble injection



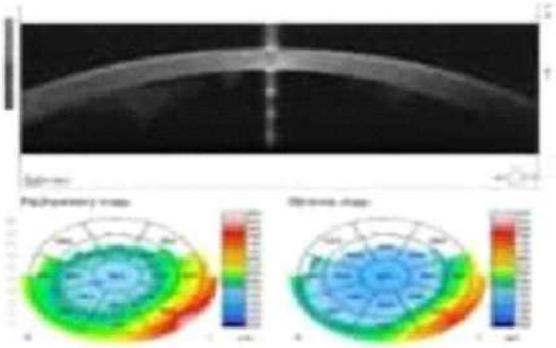
(3rd Post Operative Day)



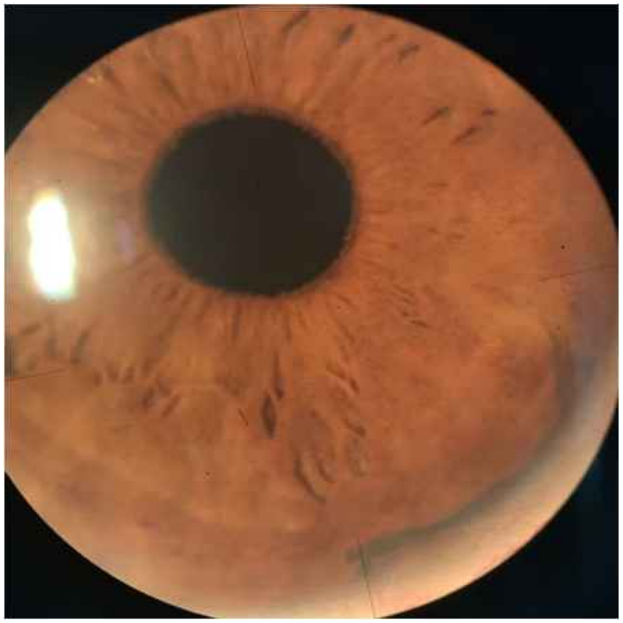
(Corneal Thickness 798)



(After Air Injection in Anterior Chamber)



(Corneal Thickness 482)



Dr Purvi Gandhi
MBBS
DO- Ist year
Dr Kamdar Eye Hospital,
Jodhpur

Day one post cataract surgery, anterior segment smart phone photography showing retained stained anterior lens capsule

"A rare case report on Indian Rooster's Spur as Retained Intra ocular foreign body"

Dr. Akshika Dhamija[1], Dr. Arvind Chauhan[1], Dr. Shweta Meena[1]
1. Dr. SN Medical College Jodhpur-Rajasthan

Introduction

Penetrating eye trauma is a potentially sight-threatening injury. The effect of injury depends on factors that include size and composition of the foreign body (FB) , force of entry into the eye, location of resulting wound, and final location of the FB. Metallic and magnetic objects are the most common Intra ocular foreign body (IOFB). Organic materials such as vegetative matter or cilia cause severe tissue reactions are highly contaminated and associated with significant risk of end ophthalmitis. Early diagnosis and removal of FB are essential for favorable outcomes. Most cases of FB in anterior chamber are detected by slit lamp examination. In some cases, FB in anterior chamber is impossible to detect without gonioscopy.

Case Report

A 9-year-old male child, resident of dist. Jodhpur Rajasthan presented to the eye department of MDM Hospital on 24th October with a history of trauma to left eye with Rooster's spur seven days back. There was retained spur of Indian Rooster in anterior chamber at 6'oclock position with mild corneal edema and anterior chamber reaction grade lll, and vision of the patient was up to 6/18 at the time of presentation. The patient consulted Community Health Centre 5 days back, where empirical antibiotics and antifungal drops were given, and patient was referred to MDM Hospital DR. S.N. Medical College, Jodhpur Rajasthan. Patient was admitted on 24th October and viral markers blood sugar and other relevant pre-op investigations were done which turned out to be normal. X-ray orbit and B-scan were done to rule out posterior segment FB. Anterior Segment-Optical coherence tomography showed shadowing of corneal layers corresponding to the location of FB. It suggested that FB penetrated the full thickness of cornea and extended into the AC. After obtaining informed consent, the patient was taken up for the removal of the FB in the operating room under topical anesthesia. Based on the AS-OCT findings, it was planned to remove the FB through the internal route. The pupil was constricted preoperatively with topical pilocarpine (2%) to prevent lens damage during the procedure. Betadine painting and draping were done, speculum applied and a side port made. Intracameral lignocaine was given. Viscoelastic and McPherson intraocular forceps were then used to remove the FB, taking care that it was removed in the same direction in which it had entered. The Anterior Chamber was washed to remove any viscoelastic and the port was hydrated. Intracameral moxiflox akin was given. Because the penetration line was small and oblique and seemed to close without any suture, the eye was closed with tight bandage. Next day dressing was opened and patient was given eye drop tobramycin and natamycin coverage to prevent infection and eye drop homide as cycloplegic for patient comfort. Intravenous antibiotics coverage was also given. On post-op day 3 patient was discharged with visual acuity of 6/12 and with no Anterior Chamber reaction.

Discussion

The aim of this report is to present the diagnosis, management, and surgical intervention of retained IOFB. Vegetative matter or organic FB can cause severe tissue reactions. Hence, must be managed properly with anti-fungal and should be removed AS SOON AS POSSIBLE. Increased awareness about eye protection, improved surgical techniques, and advancements in bioengineering are responsible for improved outcomes in injuries with retained IOFB.

References

1. American Academy of Opthalmology,IOFB(2019)
2. Bhalla JS, Lal P.Eyelash in AC:An unusual IOFB ,Delhi journal of Opthalmology (2017)
3. Srivastava SP. Cilia in AC ,Indian journal of Ophthalmology (1963)
4. Sahu S, Puri LR, Singh SK . Intraocular eyelashes and iris cyst in AC following penetrating eye injury:a case report.Int medicine Case Rep.
5. Raman M, Anuradha A, Vasumathi K, Sheela S,Subbiah GN . Intraocular cilia-A rare case report. TNAO Journal of Ophthalmic Science and Research.

A Case Report: Recurrent Idiopathic Anterior Non-necrotising Diffuse Scleritis

Dr. Ashok Kumar Meena[1], Dr. Pooja Kapadia[1], Dr. Vanshika[1], Dr. Ekta Karhana[1], Dr. Anita Rani [1], Dr. Jagdish Chaudhary[1],
Email dr.ashokmeena10@gmail.com poojakapadia1194@gmail.com
1: Department Of Ophthalmology, Kota, Rajasthan

ABSTRACT
Scleritis is a clinical diagnosis that involves a thorough ocular history and examination. Differentiating between other causes of red eye is crucial to ensure you start right treatment. In this article, we present a case of idiopathic anterior non-necrotizing diffuse scleritis. A 35year old female presented to our clinic with painful, red left eye associated with watering, photophobia and blurring of vision. This symptoms were recurrent since 3 years. She was previously treated for pain and redness but with temporary relief. She was started with oral NSAIDs (Indomethacin 75mg) along with topical steroid (Eyedrop Prednisolone 1%) after which her condition stabilized. Her treatment had not yet been discontinued. The patient's condition has remained stable, and she is currently being followed by ophthalmologist to assure that her scleritis remains controlled. Although the visual prognosis was guarded, structural integrity of the eye was achieved in this case.

BACKGROUND
The sclera is composed of three layers. These layers include the Episclera, Stroma, and Lamina fusca. The episclera is the outermost connective tissue layer and contains the superficial episcleral plexus and deep vascular plexus. The stroma is the primarily avascular middle layer and is composed of type I collagen. The lamina fusca is the inner layer, is composed of connective tissue, and anchors the sclera to the underlying choroidal tissue. Stroma and lamina fusca together makes sclera proper.

Scleritis is classified as either non-necrotizing or necrotizing scleritis. Non-necrotizing scleritis includes diffuse scleritis and nodular scleritis. Necrotizing scleritis includes necrotizing scleritis with inflammation and without inflammation. Scleritis may also be classified as anterior or posterior if inflammation is anterior or posterior to the insertion site of the extraocular muscles, respectively [1].

Autoimmune causes are most common, of which rheumatoid arthritis is by far the most common systemic condition associated with scleritis. The other associated diseases are Wegener's granulomatosis, systemic lupus erythematosus, juvenile rheumatoid arthritis, polyarthritis nodosa, relapsing polychondritis, psoriasis, gout, atopy, and rosacea. The common infective causes reported are tuberculosis, syphilis, herpes zoster and herpes simplex virus. If the particular aetiology is not found it can be Idiopathic scleritis.[2]

CASE
A 35 years old female presented to our clinic with a painful, red left eye. It was associated with watering, photophobia and blurring of vision for the past 4 days. And she also complained that similar symptoms were presented previously 3 times in last 2-3 years. For which she had taken treatment from general physician and had temporary relief. This time she had stabbing pain which is worse at night and made sleeping difficult, pain improve during day time. On presentation, she also reported foreign body sensation in her left eye (OS). She denied any symptoms in her right eye. No past history of any ocular surgery or disease. No history of any systemic disease, or allergy to medication. No associated family history.

• Upon initial ocular examination, her visual acuity (VA)
was 6/9 in the right eye
and 6/60 in the left eye improving to 6/9 with pinhole
BCVA:6/9 in RE
• EOM: Extraocular movement are full in all direction, but with mild pain during movement
• IOP: 14.6mm of Hg by Schiotz tonometer in both eyes
• Pupil : RE: Single, Round , Regular and Reacting to light LE: Single, Irregular with posterior synechiae at 12 O' Clock and 9 o' Clock position
• External examination on torch light: RE: NADLE: Deep congestion which was diffuse
• Slit lamp examination: RE: NADLE :
Eyelid : both upper and lower lid apparently normal
Conjunctiva/ Sclera: congestion, scleral thinning
AC : well formed van Herick grade
3 **Iris:** posterior synechiae at 12 o'clock and 9 o'clock With normal color and pattern
Lens: NAD

• Keratometry

	RE :	LE
K1	: 44.50	45.50
K2	: 46.25	46.50

• A-Scan
RE : 23.15 LE : 23.06

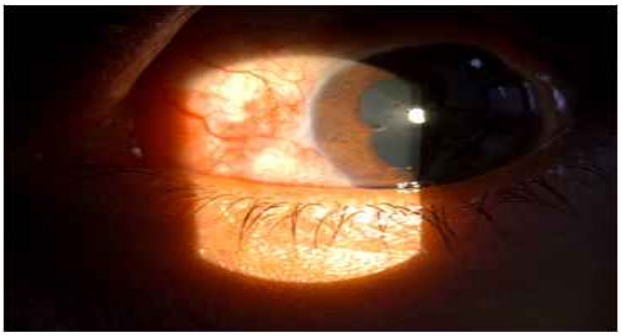


FIGURE 1: Diffuse injection of sclera

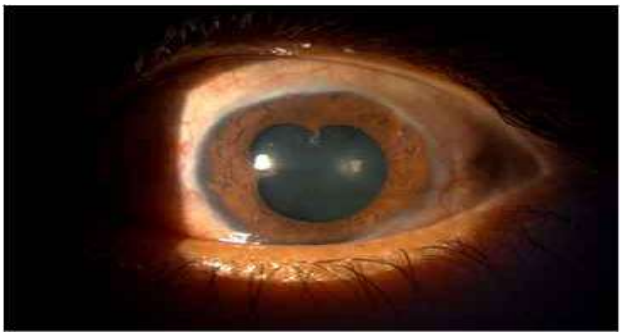
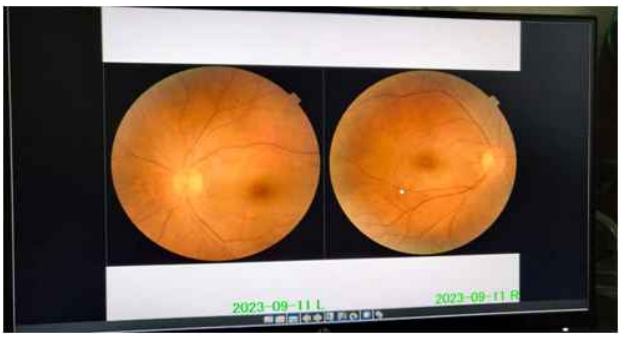


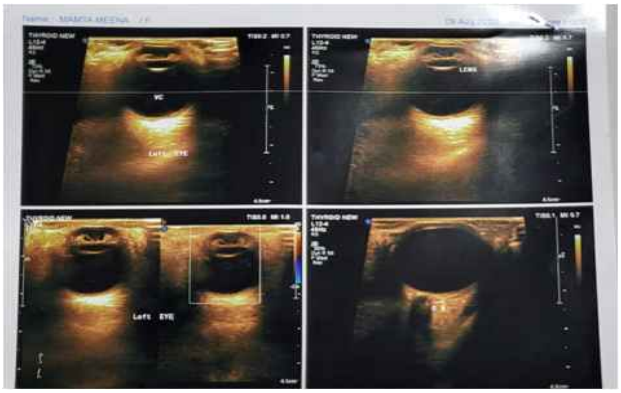
FIGURE 2: Posterior synechiae at 12 o'clock and 9 o'clock



• Dilated fundus Examination
Vitreous: Normal OU
Disc: Normal OU
Cup-to-disc ratio: Normal OU
Macula: Normal OU
Vessels: Normal OU
Periphery: Normal RE
LE: Peripheral chorioretinal degeneration
FIGURE :3 Normal fundus OU
• Lab Investigation
• Absolute Neutrophil Count:3000/MM3(2,188-7,800)
• CBC:WBC Count 5K/MM3 (4-12), otherwise normal
• CRP: 0.3mg/dL (< 0.5)
• ESR: 10 mm/Hr (0-20)
• Uric Acid: 4.51 mg/dL (2.4-5.7)
• LFT & RFT Within normal limit
• All negative: Rheumatoid factor, Anti-CCP antibody, ANA screen, dsDNA antibody, angiotensin
• converting enzyme, chest X-ray, SS-A antibody, SS-B antibody, ANCA screen, Quantiferon TB gold,
• and syphilis antibodies
• Phenylepherine test :LE: there is no blenching of tissue on applying 2.5%phenylepherine.
• B-scan ocular ultrasound:

Figure:4

vitreous, retina, optic nerve, choroid normal on B-scan



Mild vitreous opacities. No mass lesion, retinal detachment, or posterior scleritis detected OU on B-SCAN

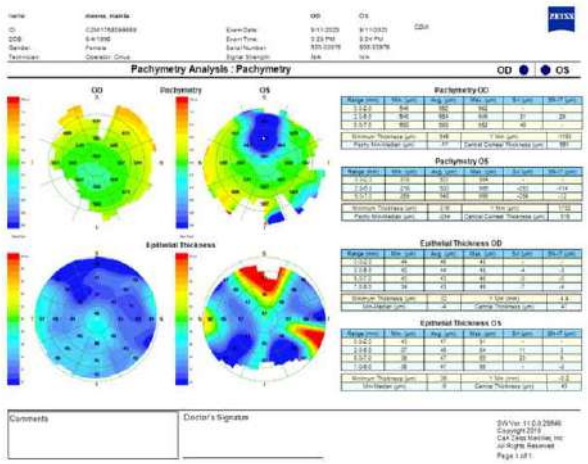


FIGURE : 5 Pachymetry of LE shows thinning of cornea superiorly[3]

• Treatment: Patient was started treatment with Tab. Indomethacin 75mg BD Eyedrop Atropine 1% TDS Eyedrop prednisolone 1% 4 Times a day

The patient's condition has remained stable, and she is currently being followed by ophthalmologist and rheumatologist to assure that her scleritis remains controlled with quite left eye.

FIGURE : 6 Post treatment ocular picture

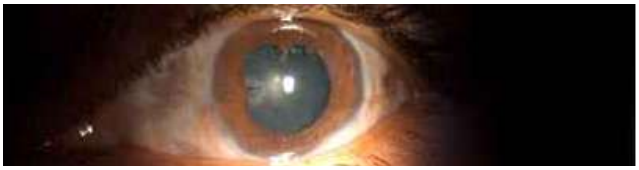


FIGURE : 7 Post treatment scleral thinning and quite LE

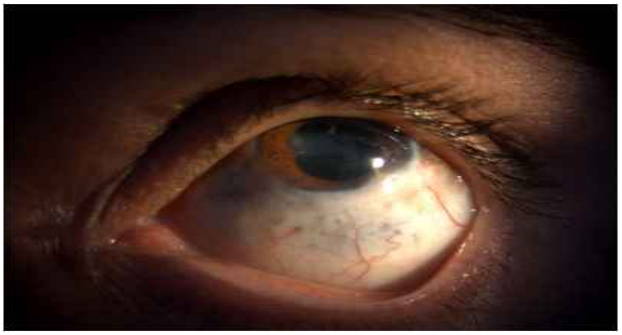


FIGURE : 8 Scleral thinning

• Differential Diagnosis of Unilateral Eye Pain and Redness Episcleritis Conjunctivitis
Elevated episcleral venous pressure and glaucoma
• DIAGNOSIS
Recurrent non-necrotizing diffuse anterior scleritis
• DISCUSSION Scleritis is an inflammatory disease of the episcleral and the deeper scleral tissues. The pain of episcleritis is less severe than in scleritis.
when a case of scleritis and/or uveitis has possibly been caused by systemic disorders such as collagen disease or infectious disease, treatment of those systemic disorders is also essential. Even when the systemic disorders are relatively stable, ocular inflammation may occur, such as in our present case, and the treatment of such patients must be conducted in close cooperation with internal physicians or rheumatologists. Diagnostic criteria for the most common underlying systemic diseases causing scleritis including RA, SLE, AS, GPA, PAN, and GCA are as follows[4]:

Rheumatoid Arthritis (RA): Joint pain and stiffness that involve the smaller joints first, especially in the hands and feet, with positive rheumatoid factor

Systemic Lupus Erythematosus(SLE) Requires four of the 11 criteria: Malar rash, discoid rash, photosensitivity, mucosal ulcers, arthritis (non-erosive), cardio-pulmonary involvement, neurologic disorder, renal disorder, hematologic disorder, antinuclear antibodies, and/or immunologic disorder.

Ankylosying Spondylitis (AS)
Joint pain and stiffness that involve the lower back, entheses that involves ligaments of the spine and the back of the heel, plain film of the pelvis revealing fusion of sacroiliac joints, and plain film of lumbar spine revealing bamboo sign. HLA-B27 is not among diagnostic criteria. but does increase risk.

Granulomatosis with Polyangiitis(GPA)
Nephritic syndrome detected by urine tests, pulmonary vasculitis detected by chest X-ray, and tissue biopsy.

Polyarteritis Nodosa (PAN)Requires documented vasculitis with three of the following: weight loss, livedo reticularis, testicular pain, myalgias, neuropathy, elevated diastolic blood pressure, elevated creatinine, hepatitis B virus infection, arteriographic abnormalities, biopsy of small or medium sized arteries with polymorphonuclear cells.

Giant Cell Arteritis (GCA) Requires three of the following: age > 50, ESR > 50, temporal headaches, scalp tenderness, biopsy proven GCA. Other findings include: constitutional symptoms, jaw claudication, vision loss, and a history of polymyalgia rheumatica (PMR). Our patient did not meet diagnostic criteria for the autoimmune/inflammatory or infections described above. Thus in our patient cause is idiopathic.[5]

TREATMENT Non-necrotizing scleritis: Topical corticosteroids, such as prednisolone Acetate ,Oral NSAIDs, such as indomethacin Necrotizing Scleritis or Non-necrotizing scleritis refractory to NSAIDs Oral corticosteroids, such as prednisone 1mg/kg/day Severe Necrotizing Scleritis and co-existing autoimmune disease Immunomodulatory agents, such as Methotrexate 15 mg weekly, as well as azathioprine, azathioprine, cyclophosphamide, mycophenolate mofetil, cyclosporine, and rituximab[6]

REFERENCE

1.Keino H, Watanabe T, Taki W, Nakashima C, Okada AA. Clinical features and visual outcomes of Japanese patients with scleritis. BrJOphthalmol.2010;94(11): 145963.

2. Fong LP, Sainz de la Maza M, Rice BA, Kupferman AE, Foster CS. Immunopathology of scleritis. Ophthalmology. 1991;98(4):4729.

3. Honik G, Wong IG, Gritz DC. Incidence and prevalence of episcleritis and scleritis in Northern California. Cornea 2013;32(12):1562-1566. https:// PubMed.gov/24145628 (https://PubMed. gov/24145628 DOI:10.1097/ICO.0b013e3182a407c3

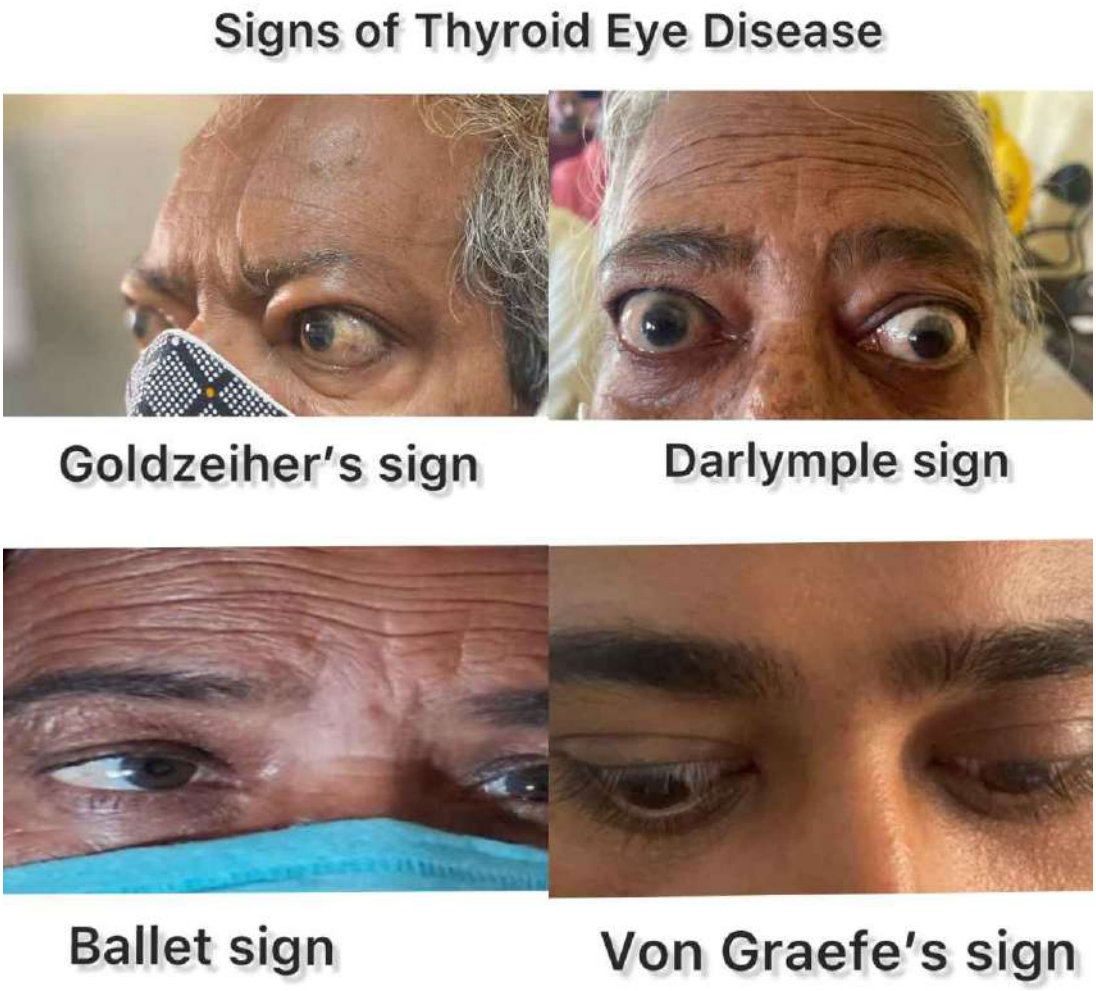
4. Raiji VR, Palestine AG, Parver DL. Scleritis and systemic disease association in a community-based referral practice. Am J Ophthalmol 2009;148(6):946-950. https://PubMed.gov/19837380 DOI: 10.1016/j.ajo.2009.07.021

5. Artifoni M, Rothschild PR, Brezin A, Guillevin L, Puechal X. Ocular inflammatory diseases associated with rheumatoid arthritis. Nat Rev Rheumatol 2014;10(2):108-116. https://PubMed.gov/24323074 (https://PubMed.gov/24323074). DOI :10.1038/ nrrheum.2013.185

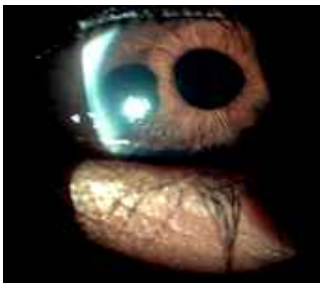
6. Daniel Diaz J, Sobol EK, Gritz DC. Treatment and management of scleral disorders. Surv Ophthalmol 2016;61(6):702-717. https://PubMed.gov/27318032 (https://PubMed.gov/27318032). DOI:10.1016/j.survophthal.2016.06.002

Dr Ashok Kumar Meena
Senior Professor
Department of Ophthalmology,
Govt. Medical College, Kota

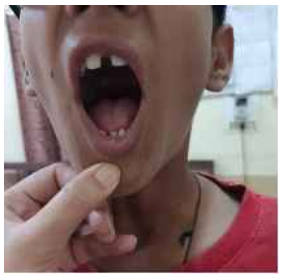
Dr. Shakshi Jain



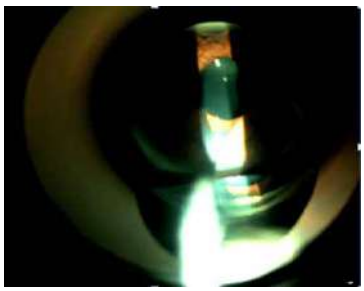
"RIEGER'S SYNDROME"



Polycoria and ectropion uveae



Microdontia



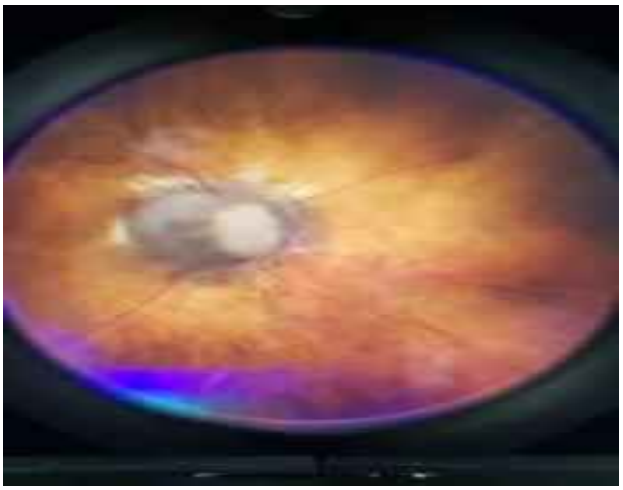
Peripheral anterior synechiae

Dr Ayushi Gupta
JLN Medical College Ajmer

Interesting Ophthalmological Images

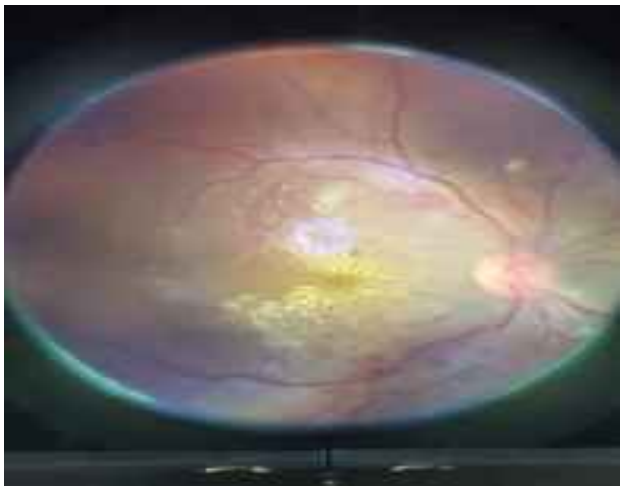
By Dr. Akshika Dhamija (S.N Medical college Jodhpur)

Posterior Staphyloma



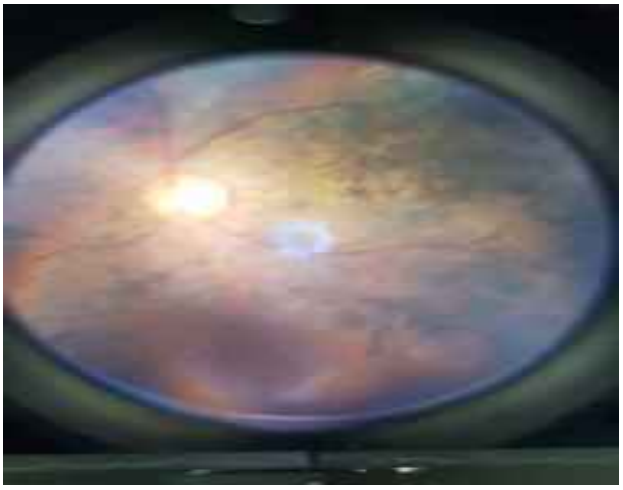
- Abnormal bulging at the Posterior segment of eye
- Caused by stretching of eye balls leading to thinning of eye's layers [Most common]
- Can result in distorted or blurred vision

Macular Star



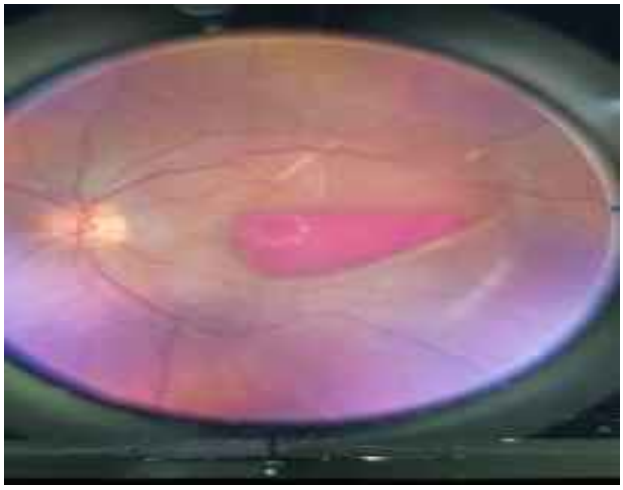
- Also known as macular exudates
- Presence of yellowish, star shaped deposits of fluid and lipids around the macula
- Commonly associated with diabetic retinopathy and hypertensive retinopathy

Retinitis Pigmentosav



- Progressive degeneration of photoreceptors cells
- Often starts with night blindness and tunnel vision
- Triad of fundus findings include:-1)Bone spicule pigmentation 2)Attenuated Retinal vessels 3)Optic disk pallor

Subhyaloid Hemorrage



- Accumulation of blood between the retina and the gel like vitreous
- Occurs in boat shape and usually immobile
- Caused by diabetic retinopathy trauma or blood clotting disorders
- Treatment is mainly conservative mangement or vitrectomy may be required

How Ophthalmology As A Branch Has Serious Toll On Your Health

Dr. Arvind Chauhan (1) Dr. Akshika Dhamija (1) Dr. Vanshika (2)
1: SN Medical College, Jodhpur
2: Government Medical College, Kota

ABSTRACT
Long term usage of operating microscopes, slit lamp biomicroscope , direct and indirect ophthalmoscope, etc by ophthalmologists can potentially have adverse effects, primarily related to ergonomic factors and eyestrain.

INTRODUCTION
Occupations across various fields can deplete an individual's energy, health and patience, and these job related challenges can significantly affect an employee's well-being and sense of satisfaction . [1]. According to the Oxford English Dictionary, an occupational hazard is defined as “a risk that is accepted as a consequence of a particular occupation” [2]. Ophthalmologists, in particular, may not always be fully aware of or may overlook the health risks associated with their work, leaving them vulnerable to various occupational issues. While the connection between prolonged microscope use and the development of visual problems and Chronic Pain Syndromes has been acknowledged for many years, awareness of these occupational hazards often only arises when an individual experience these challenges.

VISUAL RELATED PROBLEMS
The use of ophthalmic instruments demands increased effort from the accommodation and vergence system. Microscopic examination plays crucial role in ophthalmic surgery, relying heavily on magnification. This reliance on magnification extends to routine instruments in outpatient department such as slit-lamp, fundus examination using +90 D lens and indirect ophthalmoscope. Using these instruments necessitates additional accommodation and convergence to maintain the clarity and singularity of the images[3], potentially leading to binocular dysfunction among ophthalmologist .

Porcar et al. reported that, some trainees experience blurred images while using indirect ophthalmoscope, though it remains unclear whether this is due to an actual binocular vision dysfunction or inappropriate technique and learning curve. Some trainees attempt to mitigate theblur by placing +2.00 D lens in oculars, which temporarily alleviates the symptoms without adressing the underlying cause[4].

It's possible that non-strabismic binocular vision issues could manifest as symptoms under the high demands of operating and viewing microscope and during fine motor tasks such as suture handling. Additionally, the presence of refractive errors corrected by spectacles, can further complicate focusing through operating microscopes due to change in vertex distance, and potential centration issues in spectacles.

EYE STRAIN
Prolonged use of ophthalmic instruments can lead to eye fatigue , discomfort , and strain due to intense concentration required to examine fine details. This can result in symptoms like eye redness , dryness , or even headaches .

MUSCULOSKELETAL ISSUES
Ophthalmologists often must maintain specific postures while using microscopes, which can result in musculoskeletal issues over time, including neck and back pain or repetitive strain injuries. Surgeons must maintain a static position throughout surgery, especially when their posture becomes awkward due to microscope use. Often the surgeon's head is extended because of the microscope and if their arms lack support, it places static force on the shoulders. Furthermore, ophthalmic surgeons work with fine instruments, requiring them to exert gripping forces to stabilise the instruments while working on the eye.[5]

Many ophthalmologist lean forward and crane their necks to reach the oculars THE SLIT LAMP SLUMP

Hours spent in poor posture at the surgical microscope (i.e., back arched, neck bent forward) can eventually lead to chronic pain and movement restriction.

MENTAL FATIGUE

The intense concentration required for long periods can lead to mental fatigue and reduced productivity.

CONCLUSION AND DISCUSSION

Ophthalmologists face a range of medical issues specific to their specialty, which many other doctors may not be familiar with.To address these challenges, it is essential for ophthalmologist to emphasize the importance of ergonomic workspace design, take regular breaks, and undergo routine eye examination by colleagues or other eye care professionals to maintain visual health. Moreover, ensuring proper lighting and utilising adjustable microscope settings can significantly alleviate strain and discomfort.

REFERENCES

. Menaghan EG, Merves ES. Coping with occupational prob-lems: The limits of individual efforts. J Health Soc Behav. 1984;25:40623, http://dx.doi.org/ 10.2307/2136379.

2. Oxforddictionaries.com [Internet]. New York: Oxford University Press; 2000 [updated 2014 June; cited 2013 Dec 2]. Available from: http://www. oxforddictionaries.com/de□nition/american_ english/occupational-hazard.Menaghan EG, Merves ES. Coping with occupational prob-lems: The limits of individual efforts. J Health Soc Behav. 1984;25:40623, http://dx.doi.org/10.2307/2136379.

2.Oxforddictionaries.com [Internet]. New York: Oxford University Press; 2000 [updated 2014 June; cited 2013 Dec 2]. Available from: http://www.oxforddictionaries.com/de□ni-tion/american_english/occupational-hazard1.Menaghan EG, Merves ES. Coping with occupational prob-lems: The limits of individual efforts. J Health Soc Behav. 1984;25:40623.

2.Oxforddictionaries.com [Internet]. New York: Oxford University Press; 2000 [updated 2014 June; cited 2013 Dec 2].

3.G.D. Smith, P.J. Rychwalski, R.A. Shatford. Convergence insufficiency: A treatable cause of problems in microsurgery. Microsurgery, 25 (2005), pp. 113-117

4.E. Porcar, A. Martinez-Palomera. Prevalence of general binocular dysfunctions in a population of university students.Optom Vis Sci, 74 (1999), pp. 111-113.

5. Chatterjee A, Ryan WG, Rosen ES. Back pain in ophthalmologists. Eye(lond) 1994;8(pt 4):473-4

" Late-onset Bleb-related Endophthalmitis"

Dr. Yamini Saini [1], Dr. Rakesh Porwal [1], Dr. Sanjeev K. Nainiwal [1]
1. Department of Ophthalmology, J.L.N. Medical College, Ajmer

Introduction

Filtration surgery is widely employed for medically uncontrolled glaucoma. With the introduction of antimetabolites such as mitomycin-c and 5-fluorouracil, the success rate of filtration surgery has increased. However, several types of late-onset complications still develop in a significant number of cases, which should be of concern to both patients and ophthalmologists. One of these is a bleb-related infection in which bacteria invade through the filtering bleb and then through the functioning fistula between the bleb and the anterior chamber, and finally into the intra ocular tissues. This is a serious complication that can lead to permanent visual impairment. Bleb-related infection develops in the majority of cases after trabeculectomy and has become much more common due to the popularity of this procedure, but it can arise after any type of filtration surgery.

Case Report

A 44-year-old male patient came to ophthalmology OPD in JLN medical college Ajmer with complaints of redness and diminution of vision in left eye for three days. At the consultation, visual acuity in the left eye was hand movement with good light projection. Gross examination showed marked congestion with mucopurulent discharge in the left eye. IOP was 16 mmHg. Slit Lamp examination showed diffuse conjunctival congestion. At the superior limbal area there was an avascular thin-walled cystic bleb filled with dense inflammatory infiltrates with a necrotic center. Seidel's test was negative. The cornea was mildly edematous, and the anterior chamber (AC) had 4+ cells, 4+ flare, fibrin, and a 1-mm hypopyon. Peripheral iridectomy seen at 12 o'clock. Glow was absent. There was no view of the vitreous and retina on fundoscopy. The patient had a history of trabeculectomy with mitomycin-C in the left eye on 25/5/2021 and in the right eye on 6/4/2021 after having been diagnosed with chronic open-angle glaucoma. Fundus examination before surgery showed glaucomatous changes in the optic disc. IOP was not controlled with antiglaucoma medications. Three months after trabeculectomy IOP was 11 mmHg in the right eye, 8 mmHg in the left eye, while BCVA was 6/9 in the right eye and 6/12 in the left eye. Gram staining of AC tap showed many gram-positive cocci and gram-negative bacilli in clusters. Ocular Ultrasound showed membranous debris in the posterior segment. The patient was promptly started with Fortified Vancomycin and Amikacin eye drops every 5 minutes for 3 times than 1 hourly, Natamycin eye drop 1 hourly, and Atropine eye drop TDS. The patient showed no improvement, so vitreous tap was sent for culture, and intravitreal antibiotics (Vancomycin+Ceftazidime) were given. Pars plana vitrectomy was performed. On the third postoperative day, there was a significant decrease in congestion and AC reaction with the resolution of hypopyon. Patient was discharged on medications, including Fortified antibiotics, moxifloxacin and atropine eye drop.

Figure 1: Showing marked hyperemic conjunctiva, opacified bleb, hypopyon with mucopurulent discharge.

Figure: 2 Showing membrane in posterior segment on USG.

Diagnosis Late-onset Bleb-related endophthalmitis.

Discussion

The incidence of blebitis and endophthalmitis after trabeculectomy is higher than most other intraocular procedures (3). It has been estimated that the prevalence of acute postoperative endophthalmitis after any type of intraocular surgery is 0.093% (4), whereas the reported incidence of late postoperative bleb-related infections after trabeculectomy ranges from 0.4% to 6.9% in several studies over the past decade (3). After trabeculectomy with mitomycin, it is estimated that blebitis occurs with an incidence of 5.7% per year, whereas the incidence of endophthalmitis ranges between 0.8% to 1.3% per year (1, 5). Several risk factors have been associated with an intraocular infection after trabeculectomy. The inferior or nasally located bleb is one of the earliest recognized factors associated with bleb- related infection via exposure of the bleb to the bacteria-rich lacrimal lake (6). It has

been suggested that the presence of a high bleb and blepharitis increases the risk of bleb-related infection. Among the most important risk factors for bleb infection is the presence of bleb leakage (7). The pathogens from the tear film have direct access to the anterior chamber via the leaking bleb, thus bypassing the conjunctiva and the sclera. It is known that use of anti-fibrotic agents leads to a greater rate of late-onset bleb leakage than trabeculectomy without them. Histologically blebs after trabeculectomy with MMC have irregularities in the conjunctival epithelium, breaks in the basement membrane, and conjunctival and subconjunctival hypocellularity, which can all predispose to bleb leaks. A recent study has shown that MMC use is strongly associated with bleb- related infection (8).

The presence of MMC-augmented trabeculectomy made our patient susceptible to bleb-related endophthalmitis. Though the bleb was not actively leaking in the acute phase, the thin cystic and avascular nature of the bleb (figure 2), which was visible once the infection was controlled predisposed the eye to pathogen entry. It has been postulated that the combination of defects in the bleb's barrier function with altered conjunctival innate immune defense may play a role in the observed increased susceptibility to infection of antimetabolite-augmented trabeculectomy blebs (9).

Other risk factors associated with bleb-related infection are intermittent or chronic use of topical antibiotics beyond the immediate postoperative period (8), the use of systemic corticosteroids, juvenile glaucoma, silk conjunctival sutures, nasolacrimal duct obstruction, releasable sutures, pale-colored blebs, contact lens wear, younger age at the time of surgery and black race. In early bleb-associated endophthalmitis, the most common bacteria include the coagulase-negative Staphylococcus sp. and Propionibacterium acnes, which usually have a favorable prognosis for good visual acuity once the infection resolves (10). In contrast, late-onset bleb-associated endophthalmitis is usually caused by Streptococcus sp. and gram-negative bacteria such as Haemophilus influenza, which have a poorer prognosis for vision (11).

Bleb- related infection is an urgent condition that needs instant intensive treatment. It is essential to detect the disease early, distinguish the disease stage and identify the causative organism. The treatment should comprise a combined therapy of fortified topical, subconjunctival, or intraocular injection of antibiotics, and systemic antibiotic therapy depending on the severity of infection. Vitrectomy is mostly recommended when vitreous involvement is apparent or severe. Considerable controversy exists regarding the use of concomitant topical or intravitreal corticosteroids in the management of late-onset bleb-related infections. It is believed that these agents modify the inflammatory response and the resultant damage to ocular structures; however, no research has yet supported their use in this setting (12).

References

1. DeBry P. Incidence of Late-Onset Bleb-Related Complications Following Trabeculectomy With Mitomycin. Archives of Ophthalmology. 2002; 120 (3) :297.

2. Robin A. A Long-term Dose-Response Study of Mitomycin in Glaucoma Filtration Surgery. Archives of Ophthalmology. 1997;115(8):969.

3. Poulsen E, Allingham R. Characteristics and Risk Factors of Infections After Glaucoma Filtering Surgery. Journal of Glaucoma. 2000;9(6):438-443.

4. Aaberg T, Flynn H, Schiffman J, Newton J. Nosocomial acute-onset postoperative end ophthalmitis survey. Ophthalmology. 1998;105(6): 1004-1010.

5. Parrish R, Minckler D. "Late Endophthalmitis" Filtering Surgery Time Bomb?. Ophthalmology. 1996; 103(8):1167-1168.

6. Caronia R. Trabeculectomy at the Inferior Limbus. Archives of Ophthalmology. 1996;114(4):387

7. Soltau J. Risk Factors for Glaucoma Filtering Bleb Infections. Archives of Ophthalmology. 2000;118 (3):338.

8. Jampel H. Risk Factors for Late-Onset Infection Following Glaucoma Filtration Surgery. Archives of Ophthalmology. 2001;119(7):1001.

9. Lehmann O. Risk factors for development of post-trabeculectomy endophthalmitis. British Journal of Ophthalmology. 2000;84(12):1349-1353.

10. Beck A, Grossniklaus H, Hubbard B, Saperstein D, Haupert C, Margo C. Pathologic findings in late end ophthalmitis after glaucoma filtering surgery. Ophthalmology. 2000;107(11):2111-2114.

11. Song A, Scott I, Flynn M, Budenz D. Delayed-onset bleb-associated endophthalmitis. Ophthalmology. 2002;109(5):985-991.

12. Reynolds A, Skuta G, Monlux R, Johnson J. Management of Blebitis by Members of the American Glaucoma Society: A Survey. Journal of Glaucoma. 2001;10(4):340-347.

Atypical presentation of Cat-Scratch neuroretinitis

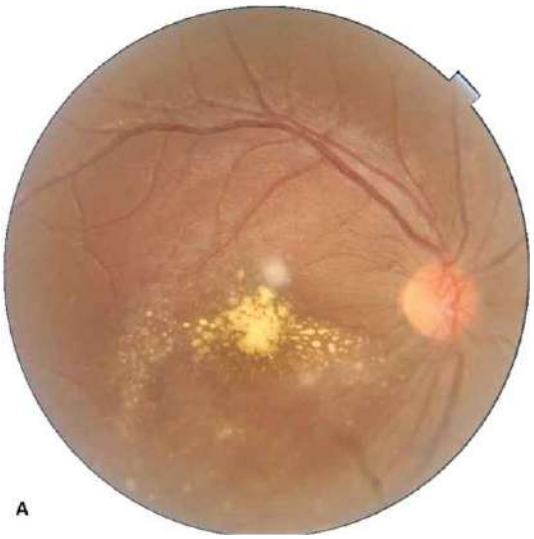
Dr. Gulshan Barwar - MBBS, DOMS, DNB, FVRS
Department of Vitreo-retina services, Sankara Eye Hospital, Jaipur

Case report

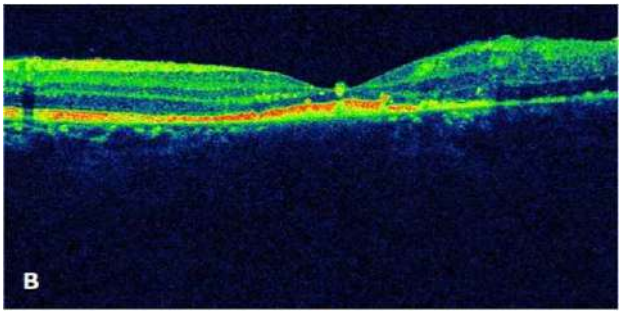
We report a case of a 24-year-old lady who presented with a diminution of vision in her right eye for 1 month. The best corrected visual acuity for the right eye was 6/24 for distance and N10 for near, and for the left eye, it was 6/6 and N6. The patient had a history of fever a week before the diminution of vision.

Clinical examination revealed a normal anterior segment examination. No signs of vitrits were seen.

On fundus examination, disc was normal in size, shape, and pink in color with a cup disc ratio of 0.3:1. Internal Limiting Membrane (ILM) folds were seen over Papillo-Macular Bundle (PMB) (Fig. A). The partial macular star was noted with hard exudate plaque at the fovea. Two yellowish-white retinitis lesions were noted superior and inferonasal to the fovea. No sub-retinal fluid was seen clinically and the periperhal retina was on.



Optical coherence tomography (OCT) revealed foveal atrophy with 157 micros of central foveal thickness (Fig. B). Hard exudates were seen and thickened RPE-Bruch's complex and Photo-receptor layer was noted. No subretinal fluid or diffuse retinal thickening was noted.



The patient brought blood investigation with her which showed raised ESR. The patient did not agree to get Fluorescein Angiography (FA) done. On palpation, sub-mandibular lymph nodes were enlarged. The patient was sent for Bartonella serology and Liver function test.

Also, the patient was started on Tablet Doxycycline 100 mg twice a day for 1 week and asked to review after a week with reports.

The literature search revealed a few isolated published case reports (1,2) on this clinical entity. Ours is a unique case having atypical features like the absence of disc edema and the absence of any subretinal fluid or retinal thickening. Although typical features like the presence of macular star, hard exudates, and unilaterality were there. Also patient has a cat as a pet at home. Declaration of patient consent The author certify that they have obatined all appropriate patient consent forms. In the form the patinet has / have given his/her consent for his/her image and other clinical information to be reported in the journal. The patient understand that their names and initials will not be publishesd and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Financial support and sponsorship Nil

Conflict of interest

No conflicts of interest

References

Lombardo J. Cat-scratch neuroretinitis. J Am Optom Assoc. 1999 Aug;70(8):525-30. Mahjoub A, Bellazreg F, Ben Abdesslem N, Sellem I, Mahjoub A, Ben Mrad S, Ghorbel M, Letaief A, Hachmi M, Fethi K. Cat scratch disease neuroretinitis: A case report. Ann Med Surg (Lond). 2021 Aug 15;69:102722.

"Epithelioid Choroidal Melanoma in a Middle-Aged male-A case report"

Dr. Jaishree Singh, Dr. Sangam, Dr. Mahendra Chaudhary, Dr. Pooja Kapadia, Dr. Anita Rani, Dr. Ekta Karhana

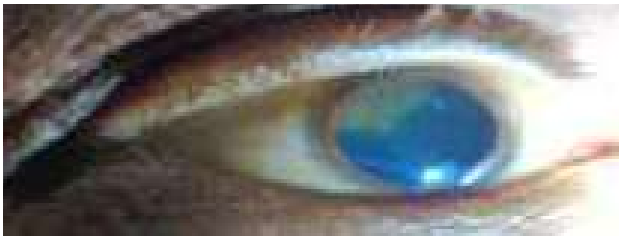
Abstract

Choroidal melanoma is a primary intraocular malignancy.Uveal melanoma is a life-threatening condition leading to systemic metastasis in approximately 25% to 40% of patients by 10 years. 1,2 Metastatic disease most often occurs in the liver (89%), followed by lung (29%), bone (17%), and skin (12%).We present a rare case of choroidal melanoma, in a 49-year-old adult who presented with two months history of headache and gradual diminution of vision, especially of inferior visual field in the right eye in our ophthalmology OPD and his investigations revealed a clinical diagnosis of choroid melanoma, which was further confirmed by histopathological finding from tissue harvested from enucleated right eye. Histopathology report presents epithelioid choroidal melanoma.

Background

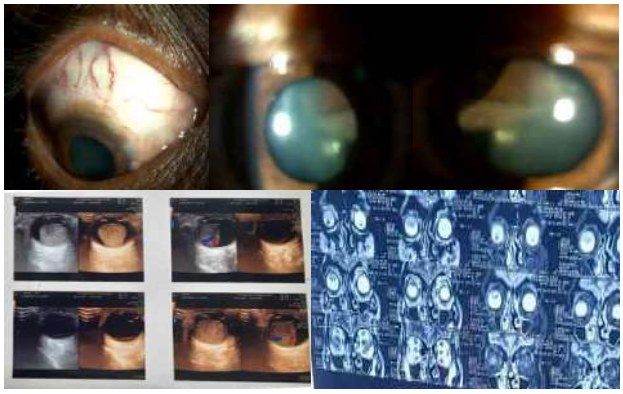
Ocular melanoma is the second most common type of melanoma after cutaneous melanoma. The most common primary intraocular malignancy is uveal melanoma. The large majority of ocular melanomas originate from uvea i.e., iris, ciliary body, and Choroid (95%), while conjunctival melanomas are far less frequent (5%) [1]. Annually around 6 million people are diagnosed with ocular melanoma [2]. Among uveal melanoma, choroidal melanoma is more common. And here, we are discussing a case of choroidal melanoma in an adult male aged 49 years old.

Here is the picture of the patient with choroidal melanoma.



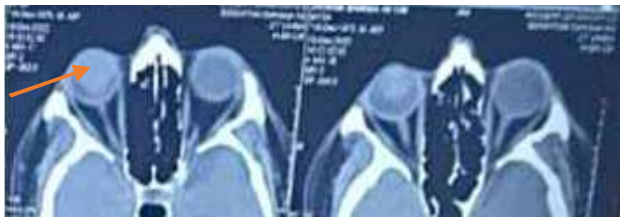
Case report

A 49-year-old male presented to the ophthalmology OPD with headache, right eye pain, and photopsia along with a gradual diminution of vision in the right eye, particularly inferior visual field loss of two months duration. His general and systemic examination was normal. Ophthalmic examination was carried out for both eyes; BCVA for right eye was 6/24, and BCVA for left eye was 6/6.The Intraocular pressure (IOP) of both eyes was within normal limits, with the right eye at 17.3mm Hg and the left eye at 12.2mm Hg with 5.5gm weight using Schiotz tonometer. Binocular Indirect ophthalmoscopy of the right eye showed disc within normal limits and a solid dark grey mass in the posterior segment (Choroid) with intense brown pigmentation, occupying posterior third of the vitreous chamber along with mild retinal detachment obscuring the macula. Left eye disc was within normal limits, and foveal reflex was seen. Slit lamp photography of right eye was done to observe the mass in posterior segment of right eye.



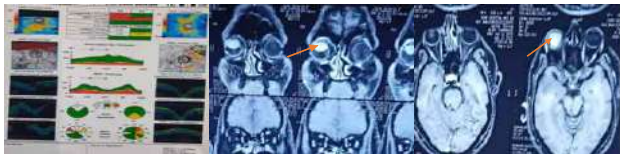
Patients right eye showing echogenic polypoidal mass on B scan image.

'B scan' ultrasound of right eye was carried out to confirm the finding and assess the size of the mass and extent of intraocular involvement; The mass turned out to be arising from the Choroid with a dome-shaped polypoidal echogenic lesion approximately 15.2*15.0 mm seen in vitreous cavity in right posterolateral aspect. Peripheral vascularity was seen. Occupying more than a third of the posterior segment of the right eye. Mild subretinal fluid collection present (max thickness =1.6mm).

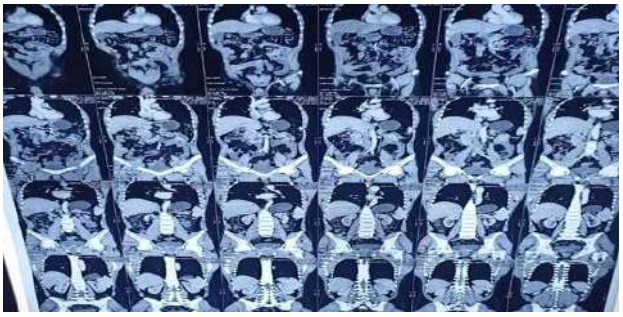


These findings further needed to be correlated with orbital CT Scan findings given above.

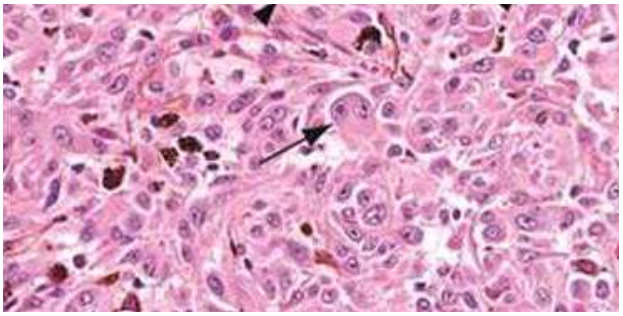
Optical Coherence Tomography (OCT) imaging of the right eye was unattainable because views of the optic nerve and macula were obstructed.



MRI with contrast showed right side intraocular mass arising from the posterolateral Choroid.
MRI confirmed the mass to be choroidal growth limited within the posterior chamber arising from the posterolateral side of the Choroid of the right eye. Considering the imaging diagnosis and clinical findings, a diagnosis of choroid melanoma was made categorized as T3a, which stage IIB according to the American Joint committee on cancer.
CT Scan of thorax and abdomen show no metastasis.



The management of choroidal melanoma involved enucleation of the right eye, and the enucleated eye and its mass were subjected to histopathological examination. The histopathological report confirmed Choroid Melanoma of epithelioid type, and its anterior border between ciliary body and equator and posterior border between equator and optic disc.



After enucleation of right eye patient was given advice for follow-up regularly as to rule out metastasis later in course of disease.

After enucleation of the right eye.

Discussion

Melanomas of the uveal tract can be divided into the lesions of the anterior and the posterior tract; the anterior tract melanoma involves the iris, whereas the posterior tract melanomas involve the ciliary body and the choroid layer. Most common among them is choroidal melanoma. This is a very rare disease with an incidence of 5-6 cases per million of population.[3] Clinically the presentation of choroidal melanomas is variable. In general, anterior choroidal melanomas have a delayed presentation because of slow growth however, clinical signs and symptoms can present earlier. Patients of choroidal melanoma usually present with blurring of vision. Patient may experience painless and progressive visual field loss as the peripheral melanoma enlarges. Floaters and at times 'balls of light' are experienced by subjects in case of necrosis of tumor or hemorrhage in the adjoining areas. Severe pain may be experienced with impingement of tumor mass on ciliary nerves or due to acute angle closure glaucoma. Not infrequently, the patient remains asymptomatic until the tumor has grown sufficiently to become necrotic and produce complications such as endophthalmitis, massive intraocular hemorrhage, and/or secondary glaucoma.Choroid layer being devoid of lymphatics hence majority of the choroidal melanomas spread by a haemotogenous route mainly from the liver. [4] The melanoma disrupts thearchitecture of the retina and its vascular supply, which leads to subretinal fluid accumulation.There is a strong association of exudative retinal detachment with choroidal melanoma.[5]Clinically, CM can present as a dome- or a mushroom-shaped mass or be lobulated. Presentation as a diffuse mass occurs in <5%. [6] Usually, they are pigmented in 55% of cases, mixed pigmentation in 30%, and predominantly amelanotic in 15%. [7] The overall prognosis of malignant melanoma of the uvea is based on several factors; however, the malignant melanoma can be said to have an intermediate prognosis, mortality being close to 50% 15 years after enucleation [8]
The modified Callender's classification of uveal melanomas has four categories:
1. Spindle cell-type tumors comprising 45% of all choroidal melanomas.
2. Pure epithelioid cell Melanomas 5% (rare occurrence).
3. Mixed cell melanoma 45% (comprising of spindle cell and epithelioid cell types).
4. Necrotic melanoma 5% (predominant cell type unrecognizable).

References

1) Abramson DH, Schefler AC, Dunkel IJ, et al. Adult ophthalmic oncology: ocular diseases. Holland-Frei Cancer Medicine. 2003;2:1242-1244.

2) Damato B. Developments in the management of uveal melanoma. Clin Exp Ophthalmol. 2004;32(6):639-647.

3) Choroidal melanoma: A short review with an Indian perspectiveBikramjit P.Pal, Saili Garge and Vikas Khetan Oman journal of ophthalmology 2017 Sep-Dec; 10(3): 135144.

4) Kath R, Hayungs J, Bornfeld N, Sauerwein W, Hoffken K, Seeber S. Prognosis and treatment of disseminated uveal melanoma. Cancer. 1993;72:2219-23.

5) Gibran SK, Kapoor KG. management of exudative retinal detachment in choroidal melanoma. Clin Exp Ophthalmol. 2009 Sep;37(7):654-9.

6) Shields CL, Kels JG, Shields JA. Melanoma of the eye: Revealing hidden secrets, one at a time. Clin Dermatol. 2015;33:18396.

7) Shields CL, Kaliki S, Furuta M, Mashayekhi A, Shields JA. Clinical spectrum and prognosis of uveal melanoma based on age at presentation in 8,033 cases. Retina. 2012;32:136372.

8) McLean IW, Foster WD, Zimmerman LE. Uveal melanoma. Location, size, cell type, and enucleation as risk factors in metastasis. Hum Pathol. 1982;13:123-32.

9) McLean IW, Zimmerman LE, Evans R. Reappraisal of Callender's spindle A type of malignant melanoma of Choroid and ciliary body. Am J Ophthalmol. 1978;86:557-64.

10) Hendrix MJ, Seftor EA, Seftor RE, Gardner LM, Boldt HC, Meyer M, et al. Biologic determinants of uveal melanoma metastatic phenotype: role of intermediate filaments as predictive markers. Lab Invest. 1998;78:153-63.

11) Semenova E, Finger P. Palladium-103 plaque radiation therapy for AJCC T3 and T4 sized choroidal melanoma. JAMA Ophthalmol. 2013;5677

12) Kalirai H, Dodson A, Faqir S, Damato BE, Coupland SE Lack of BAP1 protein expression in uveal melanoma is associated with increased metastatic risk and has utility in routine prognostic testing Br J Cancer 2014 111 1373 80

A Rare Case of Leukemia Masquerading as Diabetic Hemorrhagic Retinopathy

Authors: Dr Gufran Ali Kamdar (1), Dr Radhika Paranjpe (1)
1: Dr DY Patil Medical College and Hospitals, Pune

ABSTRACT
We present a case of a 50-year-old male patient who initially presented with visual disturbances and hemorrhagic retinopathy, which mimicked the classic presentation of diabetic retinopathy. However, further investigation revealed an underlying diagnosis of acute leukemia. This case highlights the importance of considering alternative diagnosis in patients with atypical presentations of retinal hemorrhages and underscores the need for a multidisciplinary approach to manage such cases and targeted treatment response including surgical intervention.

Keywords Leukemia, Diabetic Hemorrhagic Retinopathy, Retinal Hemorrhages, Visual Disturbances

Introduction
Diabetic retinopathy is a well-known microvascular complication of diabetes mellitus, characterized by progressive retinal damage leading to vision impairment, including hemorrhagic retinopathy. However, it is crucial for healthcare providers to consider alternative diagnosis when encountering patients with similar clinical presentations. We report an unusual case of acute leukemia masquerading as diabetic hemorrhagic retinopathy.

Case Presentation
A 50-year-old male with a 15-year history of type 2 diabetes presented to the ophthalmology clinic, expressing concern about blurred vision that had persisted for the past one year. Notably, the patient had no significant previous eye conditions or a family history of eye diseases. He reported maintaining good glycemic control over the past year, as evidenced by his HbA1c levels being within the normal range at the time of presentation.

On examination, the visual acuity was reduced to 6/60 in both eyes with intra- ocular pressure (IOP) of 14 mmHG on non contact tonometry (NCT). Slit lamp examination of the anterior segment of the eye revealed no remarkable abnormalities. However, a fundus examination exposed the presence of neovascularization over the optic disc, along with incomplete posterior vitreous detachment (IPVD) over the disc, multilayered hemorrhages scattered throughout the fundus, with a more pronounced concentration in the posterior pole. Additionally, nasal perivascular infiltrates were observed, and the left eye's fundus exhibited dispersed vitreous hemorrhage.

Optical coherence tomography (OCT) imaging disclosed retinal thickening and the presence of intraretinal fluid cysts in both eyes. Fundus fluorescein angiography (FFA) further confirmed the diagnosis by demonstrating delayed venous filling and widespread leakage from retinal vessels, findings consistent with the diagnosis of diabetic retinopathy.

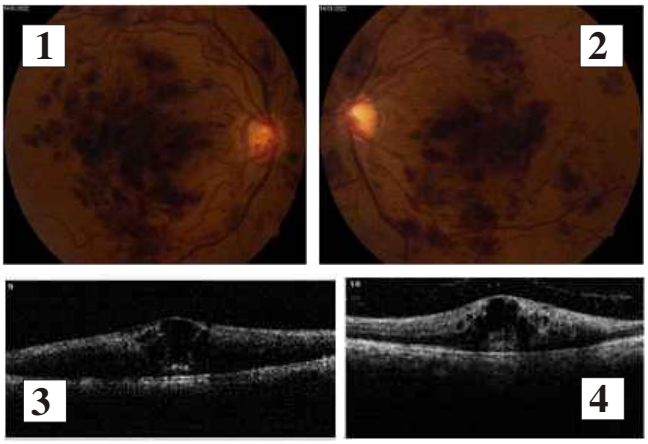


Figure 1-4, Fundus photo showing diffuse multiple, multi- layer dot and blot retinal hemorrhage with neo-vascularisation at disc in right eye (1&2). Optical coherence tomography (OCT) revealed subretinal fluid (SRF) and intraretinal fluid (IRF), hyper-reflective inner choroid (3&4), with vitreous detachment in left eye.

A tentative diagnosis of diabetic hemorrhagic retinopathy was made based on the clinical symptoms, and the patient was recommended to have intravitreal injections of anti-VEGF in both eyes at a one-week interval.

Intravitreal anti-VEGF injection delivered to the right eye. A week later, the fundus revealed more noticeable perivascular infiltration and extensive, diffuse retinal haemorrhage affecting all layers.

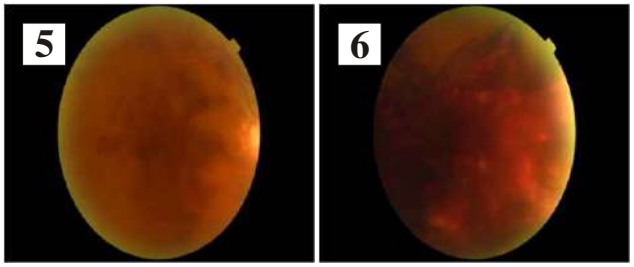


Figure 5,6:, Fundus photo showing dense pre- retinal botchy hemorrhage obscuring underlying details.

During this presentation, there was a suspicion of secondary CRVO and a notion of hypercoagulability. The patient was advised to undergo more systemic evaluation in order to rule out leukaemia and other heart issues, which were considered potential underlying causes.

Peripheral blood smear and complete blood count (CBC) were sent. Erythrocyte sedimentation rate (ESR), homocysteine, serum lipid profile, C-reactive protein (CRP), carotid Doppler, 2D echo, and abdominal ultrasound are also recommended.

A complete blood count demonstrating severe pancytopenia (4.67 x 10^9/L for white blood cells, 7.8 g/dL for haemoglobin, and 35 x 10^9/L for platelets). The USG revealed subcentimetric mesenteric lymph nodes, homogenous texture, mild to severe splenomegaly (23.5cc), and mild hepatomegaly. A peripheral blood smear and a bone marrow aspiration performed as part of an additional haematological evaluation revealed pronounced leukocytosis with mature cells. With an abnormal immunophenotype, flow cytometry verified the diagnosis of Chronic Lymphocytic Leukaemia (CLL). Using CD19 vs. scatter gating in multicolor flow cytometry revealed CD5 and CD23 positive results. Immunophenotyping revealed that CD 5, 23, 20, 19, KAPPA-positive, and CD 8, 4, 3, 7, FMC7, CD 79B, and CD 10 were LAMBDA-negative.The results of cytogenetic investigation showed a positive chromosomal abnormality (Del 13q (RB1)).

Bone marrow aspirate, showed hypercellular marrow and a higher concentration of mature lymphocytes with a uniform appearance. There are fewer normal hematopoietic cells.

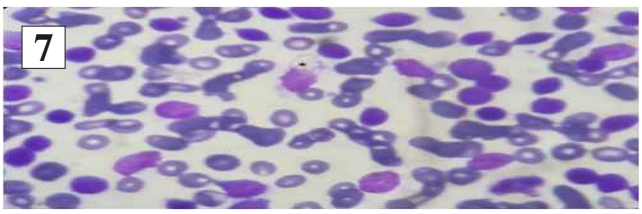


Figure7: Peripheral blood (PB) film, showing a uniform population of small mature lymphocytes.

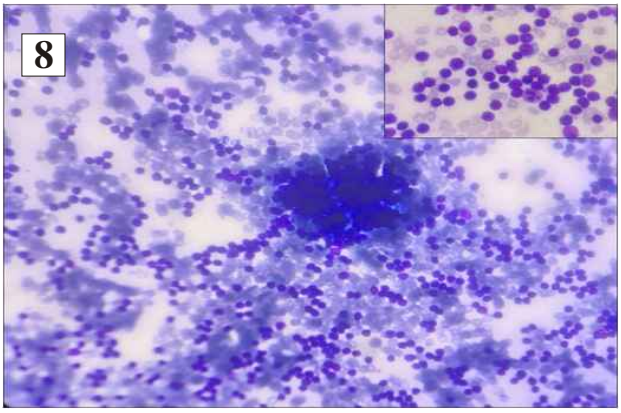


Figure 8: Bone marrow aspirate, showing hypercellular marrow and contains increased numbers of mature lymphocytes which are generally uniform in appearance. Normal haematopoietic cells are reduced. MGG x40 (Inset) lymphocytes are small mature with clumped chromatin and scant rim of cytoplasm, MGG × 100.

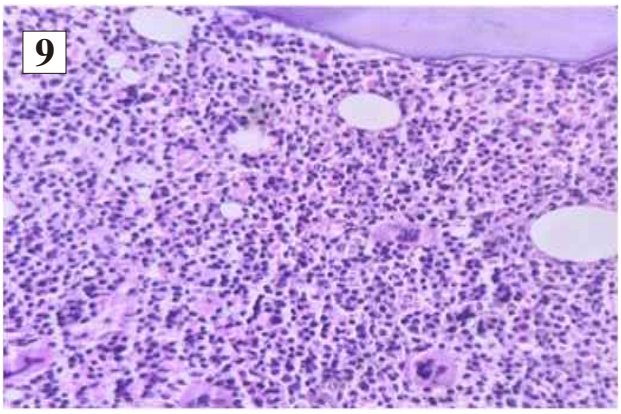


Figure 9: Bone marrow trephine section, showing diffuse infiltration (' packed marrow ' pattern). Paraffin- embedded, H & E × 40

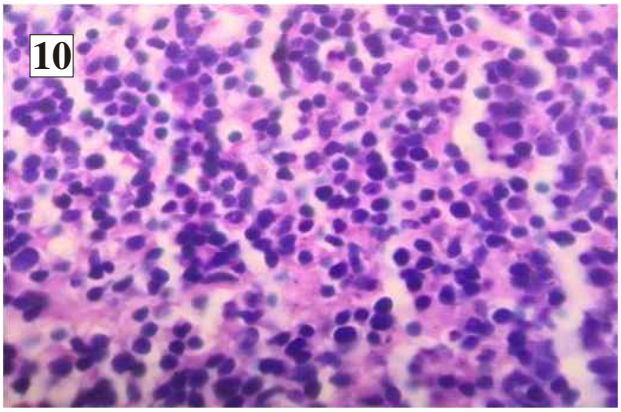


Figure 10: Bone marrow trephine biopsy section, showing pleomorphic small and medium - sized lymphocytes. Paraffin embedded, H & E × 100.

The patient was quickly referred to the hematology-oncology division for additional care, which included tyrosine kinase inhibitor-assisted targeted therapy and induction chemotherapy. Following the administration of 5 mg of chlorambucil, the patient began the RB Protocol for chemotherapy (Day 1: Rituximab 100 mg, 500 mg, and 150 mg of bendomustine; Day 2: Bendomustine 150 mg). The patient has now finished six rounds of chemotherapy. Mean while undergoing pars plana vitrectomy for non-resolving vitreous haemorrhage and intravitreal anti-VEGF injection in the left eye.

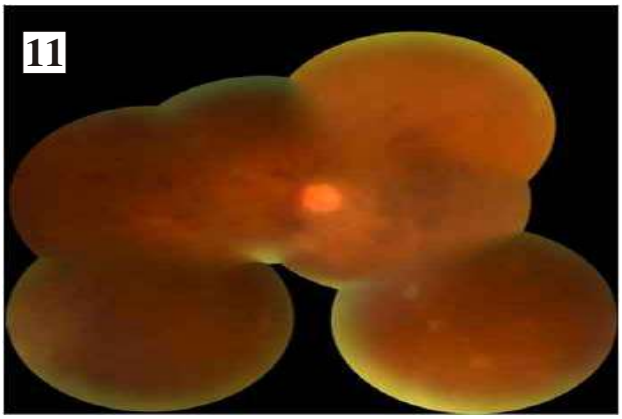


Figure 11: Left eye fundus showing diffuse multi layer retinal hemorrhage with peri- vascular infiltration and vitreous hemorrhage

With well-controlled blood parameters, his best corrected visual acuity at the last follow-up was 6/18 in his right eye and 6/12 in his left.

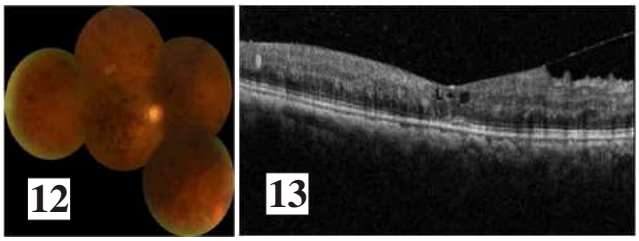


Figure 12 &13 : Fundus photo and OCT of right eye post intra-vitreal injection anti VEGF showing diffusely scattered retinal hemorrhage with fibrosis along arcade, OCT image showing few para-foveal cystic spaces with epi-retinal membrane

Discussion

Leukemic Retinopathy is the most common ocular manifestation of leukemia. It may be the first indication of manifestation relapse or early worsening of the condition. Retinal manifestation are indirect complications of leukemia specially due to hematological abnormalities. Additionally, leukemic infiltration of the retina can occur, leading to retinal thickening and fluid accumulation.

Few clues to diagnose leukemic retinopathy clinically:

1. Retinal hemorrhages at all level
2. Large blotchy hemorrhages
3. Sub ILM/ sub hyaloid hemorrhages
4. Peri vascular infiltrates
5. CRVO due to hyperviscocity

The presented case underscores the importance of considering alternative diagnoses in patients with retinal hemorrhages, especially when the clinical presentation deviates from the typical course of diabetic retinopathy. Although diabetic hemorrhagic retinopathy can cause vitreous and retinal hemorrhages, the abrupt onset and rapid progression of visual symptoms, should raise suspicion of an underlying hematological disorder. Leukemic retinopathy may have more aggressive systemic disease that might lead to worse prognosis. Leukemic retinopathy as a initial presentation of systemic diseases has more poor survival rate as compare to without ophthalmic involvement.

Conclusion: This case report highlights the importance of maintaining a high index of suspicion for alternative diagnoses when encountering patients with retinal hemorrhages, even in the presence of known comorbidities such as diabetes mellitus. Prompt multidisciplinary evaluation and appropriate investigations are crucial for timely diagnosis and management, as early intervention can significantly impact patient outcomes. Healthcare providers should consider hematological disorders in the differential diagnosis of diabetic hemorrhagic retinopathy, particularly in cases with atypical clinical features.

Dr. Gufran Ali Kamdar
MBBS,
MS Ophthalmology-Ist year

Dr. DY Patil Medical College and Hospitals, Pune

Dr. Radhika Paranjpe
Associate Professor
Dept. of Ophthalmology

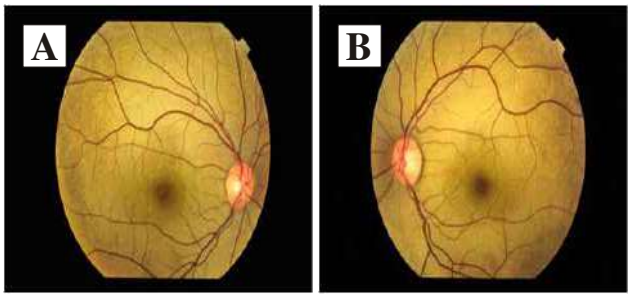
Dr. DY Patil Medical College and Hospitals, Pune


Navigation
Guided
Surgery

World Sight Day Poster of ROS Unveiled by Dr Raghu Sharma, Hon. Health Minister of Rajasthan

"Winner of Kaksha series"

A 28-year old male came with complaints of reduced vision in both eyes for past 3 months. His Best corrected visual acuity was 6/6 in both eyes with 0.5DC. The anterior segment was normal. Fundus showed a normal disc and macula with diffuse golden sheen [Fig. A&B].



What are you dealing with?
What is your next step?

1. History- ask for difficulty in night vision
2. Family history
3. Repeat IDO

Correct answer
Repeat IDO after 20-30 minutes

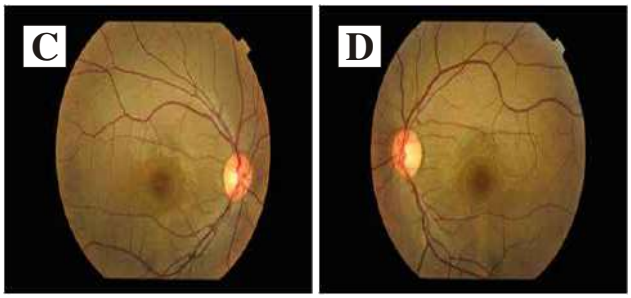


Figure 1: Fundus photos of the right (A) and left (B) eye reveal a golden sheen caused by the Mizuo-Nakamura phenomenon. The golden sheen is extinguished after 45 minutes of dark adaptation as seen in the fundus photos of the right (C) and left (D) eye.

We are dealing with Mizuo- Nakamura phenomena

Discussion

The Mizuo- Nakamura phenomena is described as a dark or golden hue of fundus under bright light exposure as when we throw light of IDO and it changes to normal fundus color after prolonged dark adaptation (3-12 hrs). Its biochemical basis is not known. It is speculated to be the result of elevated extracellular potassium levels generated in the retina in response to an excessive stimulation of rod photoreceptors. Mutation in Rhodopsin kinase (GRK) or Arrestin (SAG) gene lead to disruption in the step of inactivation of rods phototransduction. The recovery of light sensitivity is related to the time taken for rhodopsin regeneration.

Differential diagnosis - Mizuo- Nakamura phenomena
1. Oguchi's disease 2.Retinitis pigmentosa
3. X-linked retinoschisis 4. Cone-rod dystrophy

Probable diagnosis

Oguchi's disease is a rare autosomal recessive form of congenital stationary night blindness with a greyish or green-yellow discoloration of the fundus at the posterior pole or extending beyond the arcades, which reverts to normal on prolonged dark adaptation (Mizuo phenomenon). Caused by a disruption in the steps of inactivation of rod phototransduction. Patients with this disease often complain of static nyctalopia since childhood and a preservation of vision in bright light. Visual acuity is normal or mildly reduced and photopic visual fields and color vision are normal. The fundus will be otherwise normal in these patients. The dark adaptation curve in patients with Oguchi's disease is distinctly prolonged, while the early cone branch of the curve is normal.The combination of normal cone function, delayed rod ERG dark adaptation, and marked rod desensitization to a bright flash is distinctive for Oguchi's disease.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms.

Financial support and sponsorship Nil.

Conflicts of interest There are no conflicts of interest.

References

1. Dryja TP. Molecular genetics of Oguchi disease, fundus albipunctatus, and other forms of stationary night blindness: LVII Edward Jackson Memorial Lecture. Am J Ophthalmol. 2000 Nov;130(5):547563. doi: 10.1016/S0002-9394(00)00737-6. doi: 10.1016/ S0002-9394(00)00737-6.
2. De Jong PT, Zrenner E, van Meel GJ, Keunen JE, van Norren D. Mizuo phenomenon in X-linked retinoschisis. Pathogenesis of the Mizuo phenomenon. Arch Ophthalmol. 1991 Aug;109(8) :11041108.doi: 10.1001/archopht.1991. 01080080064029.doi: 10.1001/archopht.1991.01080080064029
3.Yuan A, Nusinowitz S, Sarraf D. Mizuo--Nakamura phenomenon with a negative waveform ERG. Br J Ophthalmol. 2011 Jan;95(1):1478, 156. doi: 10.1136/ bjo.2009.158980. doi: 10.1136/bjo.2009.158980.

Dr. Raj Shri Hirawat
MD (AIIMS), DNB, FRCS
Vitreo Retina Fellowship,
Sankara Nethralaya, Chennai.
Dr Kamdar eye hospital
Associate editor
Rajasthan Journal of Ophthaomology

A. Congenital Retinal Macrovessel (CRM)

A large aberrant retinal vessel, typically a vein, crossing the central macula with a vascular distribution above and below the horizontal raphe. Also known as Arteriovenous malformation of the retina or Retinal venous malformation (RVM) Rare entity

Vision loss is rarely encountered and may be attributed to macular hemorrhage, serous macular detachment,or foveal cystoid formation.

Diganosis

A. Clinical-macrovessel transversing the horizontal raphe

B. Imaging- MRI brain- to rule out CNV venous malformation

B. Ocular surface squamous neoplasia (OSSN)

Abnormal growth of dysplastic squamous epithelial cells on the surface of the eye.

Clinical variant

Conjunctival intraepithelial neoplasia (CIN)

Corneal epithelial dysmaturation, corneal epithelial dysplasia, and corneal intraepithelial neoplasia

Squamous cell carcinoma (SCC)

Mucoepidermoid carcinoma

Diagnosis

Gelatinous or plaque like interpalpebral conjunctival gray or white lesion

Optical coherence tomography (OCT): in vivo diagnostic modality in the detection of OSSN. There are distinctive features of OSSN, such as hyper reflectivity, thickened epithelium, and abrupt transition from normal to abnormal tissue.

Ultrasound Bio- Microscopy

Impression cytology: Noninvasive method to diagnose and clinically monitor patients with OSSN.

Confocal microscopy

Treatment

1. Topical chemotherapeutic agents-Interferon-α2b, mitomycin C, and 5- fluorouracil
2. Surgical excision

C. Capillary hemagioma of eye lid

Also known as infantile hemangioma, juvenile hemangioma, or strawberry nevus of infancy.

One of the most common benign orbital tumors of childhood.

Involvement can be cutaneous, subcutaneous, or with orbital extension.

Diagnosis

1.Clinical

A. Superficial, presenting as a red, raised lesion

B. Deep, presenting as a dark blue lesion that may extend into the orbit

2. Imaging helps delineate the extent of orbital involvement

Treatment

Is only initiated for lesions threatening vision (from amblyopia, exposure keratopathy, optic neuropathy)

1. Beta-blockers, systemically and topically-Currently first line treatment
2. Corticosteroids, both oral and injected
3. Surgical excision
4. Embolization.

D. OCTA (Optical coherence tomography angiography)

It analyses reflectance pattern from tissues wherein the motion contrast exhibited by cells within blood vessels of the retinal vasculature is detected and analyzed. The moving particles appears bright and non-moving one appears dark. As the only moving tissue in the eye is blood particles, OCTA can image entire vascular pattern without any dye contrast.

Uses

Can study the different layers of vascular plexes in the retina viz superficial, intermediate and deep retinal vascular plexes.

Detects the choroidal or retinal new vessels without dye contrast.

Can detect extent of flow void areas which is the capillary non-perfusion areas at individual retinal and choroidal vascular layers.

Limitations

Cannot detect the leakage from vessels.

Acknowledgment

Dr Maya Hada
Dr Raj Shri Hirawat
Dr Nagesha CK

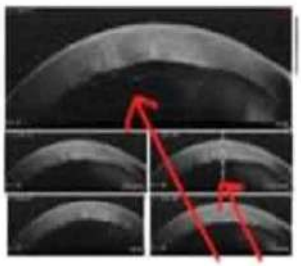
Winner of ophthalmic image

Issue-1

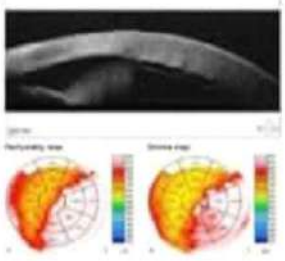
Dr. PRATEEK JAIN
MBBS, MS, DNB, MNAMS
Consultant Ophthalmologist
Paliwal Eye Hospital, Jodhpur

Winner of ophthalmic image

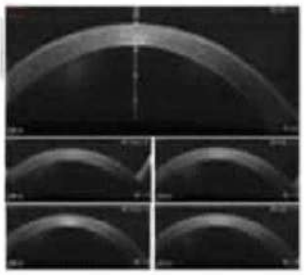
Issue-2



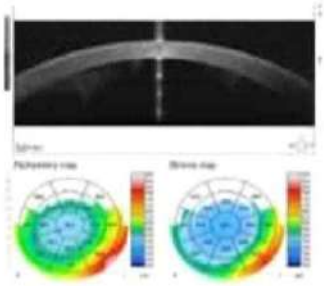
(3rd Post Operative Day)



(Corneal Thickness 798)



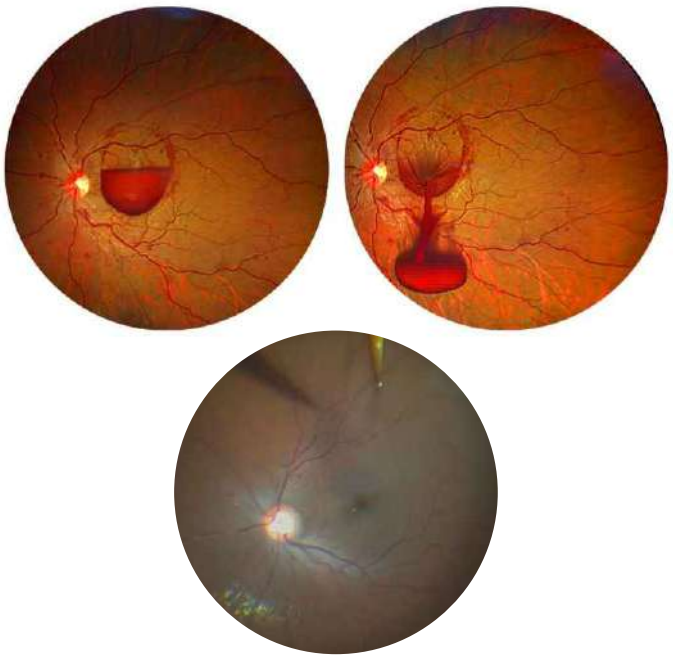
(After Air Injection in Anterior Chamber)



(Corneal Thickness 482)

Dr Manish Joshi
Apna Nethralaya, Jodhpur

Acknowledgment of cover page image



Dr Vishal Agrawal
MD (AIIMS),FRCS,FACS,FASRS
Vitreo Retina Fellowship,
Sankara Nethralaya, Chennai

Director **Agrawal Hospital , Jaipur**
Chairman Scientific Committee
Rajasthan Ophthalmological Society

Ex-Professor of Ophthalmology
SMS Medical College , Jaipur
Past Secretary
Jaipur Ophthalmological Society

Fun Time

TECNIS Eyhance IOL Celebrating Two Global Achievements

TECNIS Eyhance™ IOL
>4 million
Landmark Reached Globally

A Monofocal Plus IOL is designed to enhance intermediate vision[1] and elevate expectations for everyone.

reddot winner 2023

Johnson & Johnson Vision earned the Red Dot Award: Product Design for TECNIS Eyhance™ IOL

For Healthcare Professionals Only

Reference:
1. R. Menucci et al, JCRS 2020, 46;378-387

AGRAWAL HOSPITAL

Super Speciality Health Care

North India's leading

Vitreo-Retina Surgery

& Eye Care Centre

World class Eye & Retina Care
"By AIIMS & Sankara Nethralaya Alumni"

Dr. Vishal Agrawal

MD (AIIMS), FRCS, FASRS, FACS
Vitreo-Retinal Fellowship,
Sankara Nethralaya, Chennai

- ☑ Ultra wide field imaging
- ☑ Advanced retinal diagnostics
- ☑ Pattern laser system
- ☑ 2 fully functional retina surgery OT
- ☑ ROP & Paediatric retinal disease management
- ☑ Experience of more than 10,000 complex surgeries
- ☑ Others Services- MICS., Glaucoma, Oculoplasty

Constellation vision system "The Gold Standard in Vitrectomy"

Agrawal Hospital, Jaipur introduces

Rajasthan's First

Ultra Wide field Retinal Imaging

CLARUS 700 by ZEISS

Contact Now:

0141 2750818 www.agrawalhospital.co.in

Apex Circle, Malviya Nagar, Jaipur-302017

Emplanelled with RGHS, CGHS & all major TPA's