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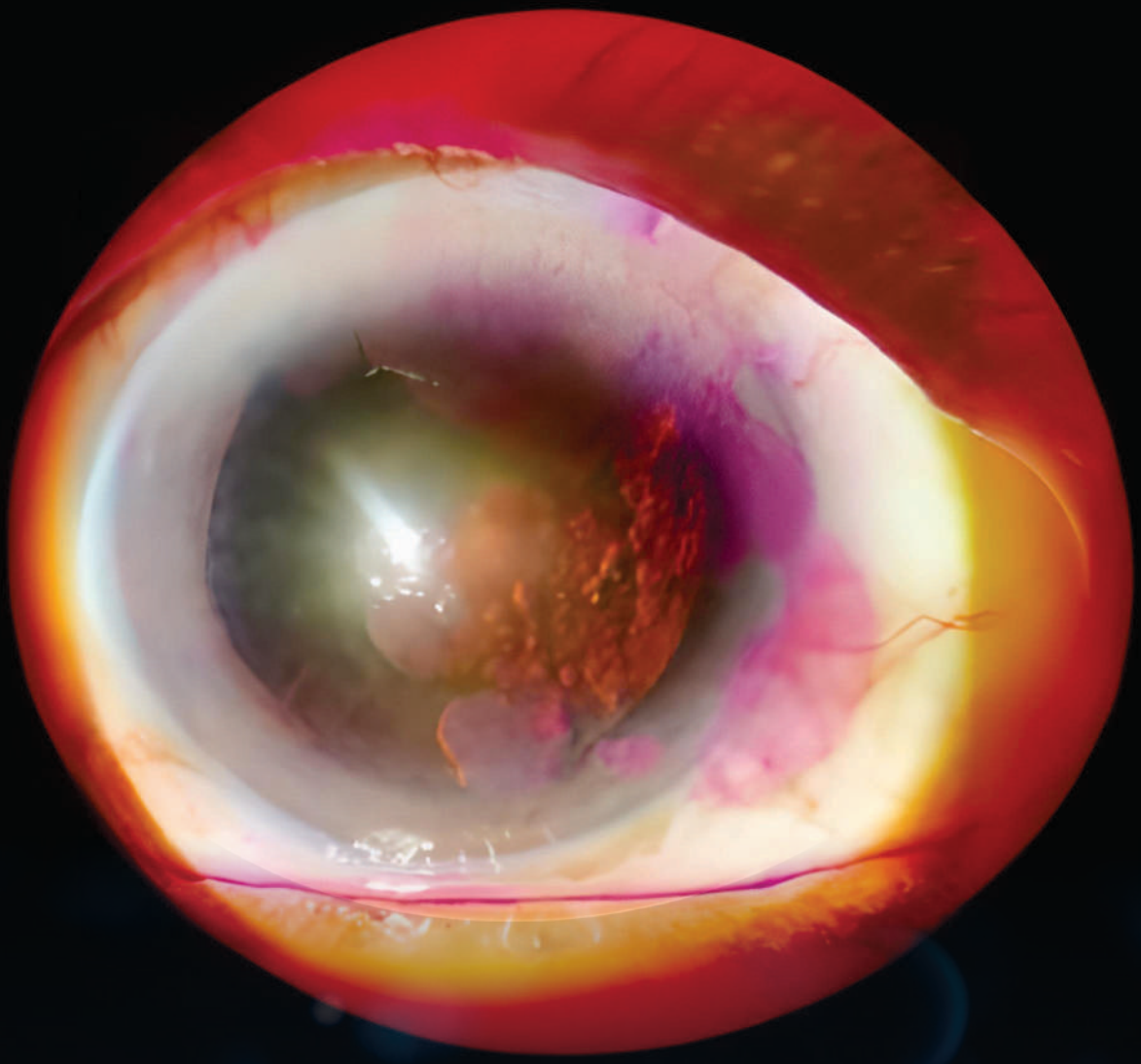
From Darkness to light

JOURNAL OF VISION SCIENCES

OFFICIAL PUBLICATION OF THE KARNATAKA OPHTHALMIC SOCIETY



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Editor's Desk

Dear esteemed KOS members,

Warm Greetings to one and all!

It is indeed my pleasure to release the 4th Scientific Journal - "Journal of Vision Sciences", with the next collection of interesting articles: guest editorials, original and review articles, case reports and surgical techniques.

My sincere gratitude to all the Authors for their contribution and all the young and dynamic Reviewers for sparing their valuable time in giving suggestions for the betterment of the articles.

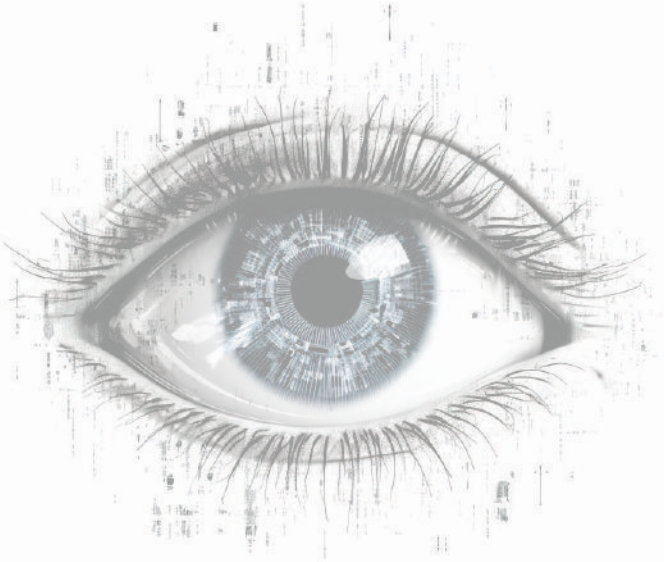
I thank the associate editor, Dr Sunil Ganekal, the entire editorial team and the editing team for their tireless efforts and wholehearted commitment, the office bearers for their encouragement, Mrs. Asha Kishore, our KOS admin for her constant support and my colleagues and friends for their help and encouragement in the release of the journal.

JVS is an online, peer reviewed, open access journal. Articles are invited in the form of original article, review article, case report, case series, brief communications, surgical pearls, PG corner and clinical images/ Photo essay. Articles can be shared to the editor's email id.

The link for previous journal articles and newsletters can be accessed from the link **https://kosonline.org/journals/**

Looking forward for your contributions and continuous support.

Let us together enhance the standard of our Journal.



With warm regards

Dr. Kavitha V
Editor in Chief
Sankara Eye Hospital, Shivamogga
editorjournal@kosonline.org

From President's Desk

Warm greetings to all members of our Ophthalmology community!

It gives me great pleasure to address you through the 4th KOS scientific journal, *Journal of Vision Sciences*.

As we reflect on the remarkable progress within our field, it is inspiring to witness advances in the frontiers of eye care, research, and innovation.

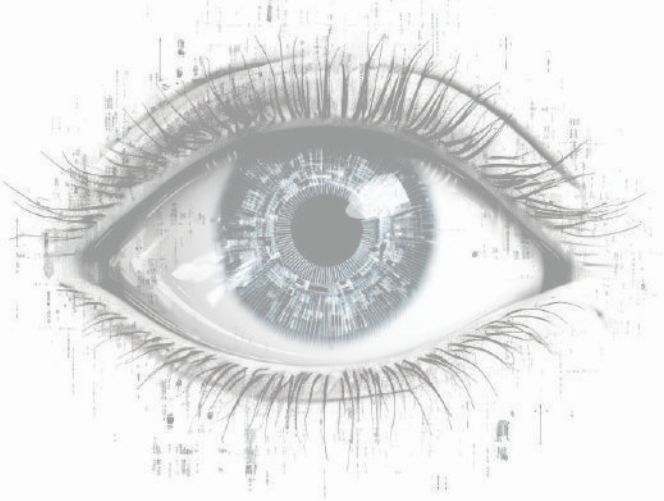
I would like to extend my heartfelt congratulations to the editor, Dr Kavitha and the editorial team for their outstanding work and unwavering commitment to achieve excellence.

I also wish the team the very best in getting our journal indexed.

Under their leadership, the journal shall continue to serve as a platform for high-quality research and insightful discussion, fostering academic growth and guiding clinical practice for the betterment of patient care. I request all the KOS members to support and contribute towards this progress

To our contributors and reviewers, thank you for your invaluable efforts and precious time.

As we move forward, let us continue to build upon our collective achievements with renewed enthusiasm, curiosity, and compassion for those we serve.



With warm regards and Best Wishes

Dr Ravindra Banakar

President

Karnataka Ophthalmic Society

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Writing a scientific article - Simplified!

Dr. Kavitha V

Sankara Eye Hospital, Shimoga

Writing an article be it for a blog, magazine, newsletter, or academic outlet is a craft. To do it well, one needs clarity of purpose, structure, readers- focus, polished writing, and ethical integrity. Below is a step-by-step roadmap for creating an article that engages, informs, and stands up to scrutiny.

1. Clarify your purpose

Start by asking:

- Why am I writing this article? Inform, persuade, reflect?
- Who will read it? What do they already know? What do they care about?
- What will they gain? What need or question of theirs does this address?

Reader's orientation is crucial: writing to "everyone" often ends up speaking to no one.[1] In the academic publishing realm, Bhutiani emphasizes that many manuscripts get rejected because they fail to match the journal's focus or reader expectations.[2] By analogy, one's article should match the platform and target readers.

2. Choose a specific, focused topic

Broad topics often lead to vague or superficial articles. Instead, pick a specific angle or question. Make sure it is manageable in the space you have. According to a practical guide: "An ideal topic is focused enough to address in a single article."[3] This ensures depth, rather than scatter-shot coverage.

3. Conduct research and gather supporting material

- Even seemingly informal articles benefit from credible support. Collect facts, statistics, examples, anecdotes, quotes.[4]
- Track your sources (for ability and transparency).[5]
- **Be aware of ethical and accuracy issues**: in academic publishing, weak methodology, poor writing or ethical lapses can lead to rejection or even retraction.[2]
- If relevant, note visuals (charts, photos) and permissions.

Strong support gives your article weight and trustworthiness.

4. Create a structured outline

Before writing full sentences, map out your article.

A helpful structure:

- **Introduction:** hook the reader + statement of purpose
- **Body:** 2-5 sections/paragraphs, each with one main idea
- **Conclusion:** summarise + takeaway

Outlining helps maintain flow, avoid repetition, and keep focused. Many writing guides emphasise how an outline keeps you on track.[6]

5. Draft a compelling introduction

Introduction of any article must do three things:

- Hook the reader (interesting fact, question, anecdote)
- Introduce what you'll cover
- Explain why it matters

"Have you ever wondered why some articles grab your attention from the first line, while others you abandon after a paragraph?" A strong introduction sets expectations and draws the reader in.

6. Develop the body of the article with clarity and structure

When writing the body of the article:

- Begin each paragraph with a topic sentence (the main idea).[7]
- Follow with supporting detail (facts, examples, quotes).[7]
- Use transitions so the reader moves smoothly from one idea to the next.
- Keep sentences and paragraphs accessible- avoid long, convoluted phrasing.[8]
- In an academic style context, one may adopt "TEEEL": Topic – Explanation – Evidence – Example – Link.[9]

Quality of writing and clarity are the key factors: Bhutiani notes that poor writing or formatting is frequently a reason for rejection of manuscripts.[2] Thus, even in a non-academic article, clear and reader-friendly language matters.

7. Craft an effective conclusion

The conclusion should:

- Briefly recap your key points
- Reinforce the article's core message
- Provide a takeaway: reflection, actionable advice, question for the reader
- **Avoid introducing entirely new ideas**

A strong conclusion gives closure and leaves the reader with something memorable.

8. Choose a catchy, clear title

Your title is often the first thing readers see and decide on. A good title is:

- Short and clear
- Reflective of the article's content
- Intriguing enough to draw attention (without being misleading)

For example: "5 Essential Steps to Write a Powerful Article"

Headlines matter especially in online formats because they affect clicks and engagement.[3]

9. Revise, edit and proofread thoroughly

A first draft is just the beginning. Effective editing covers:

- Grammar, spelling, punctuation
- Clarity: remove redundant words, simplify complex sentences
- Structure: check that paragraphs flow, that each section connects to your purpose
- Format: headings, sub-headings, bullet lists (where appropriate)
- Visuals: ensure captions, permissions and relevance

Bhutiani highlights that attention to writing quality, formatting and publication guidelines dramatically reduces risk of rejection.[2]

Even for a blog or magazine article, polish makes a difference.

10. Uphold ethical and credible practices

Ethics and credibility are fundamental- no matter the article context. Key considerations:

- Proper attribution of quotes, ideas and visuals
- **Avoid plagiarism—always use your own wording or attribution**
- Transparency if you are using external tools or sources
- Accuracy of facts and fairness of representation

In the academic world, retractions often occur due to ethical compromises or inaccurate representation of data.[1]

Being honest and ethical builds trust with your reader.

11. Tailor to your platform and audience

Different platforms require different formats, tones, and styles. Before finalising your article:

- **Check platform guidelines (if submitting)** — word count, tone, headings, submission format
- Adjust tone: conversational (blog) vs formal (academic)
- Format for readability: especially online-small paragraphs, headings, bullet points
- Consider SEO (if online) or discoverability (keywords) when relevant.[10]

Matching the expectations of your outlet increases your article's chances of success.

12. Publish and promote

After you publish:

- Ensure the article displays well (formatting)
- Share it with others
- Monitor feedback, comments, and engagement - this helps you learn what works for your readers
- Use reader insights to inform future articles

Writing is not only creation but connection: your readers form part of the equation.

Why These Steps Matter?

Writing an article is not merely about producing words—it's about clear communication. When you keep your reader in mind, define your purpose, structure your ideas, research, write clearly, and revise carefully, your content has a much better chance of being read and remembered.

In formal academic publishing, many issues (rejection, poor impact, retraction) stem from mismatched audience, weak writing, lack of novelty, or ethical laxity.[2]

Final Thoughts

Writing an article is a craft; one can improve with each piece. Begin with purpose and audience, research and outline properly, write clearly, edit thoroughly, and publish thoughtfully. Over time, these steps become second nature - and our articles will not only get written, but read and valued

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Sankara Eye Foundation India - World Class Eye Care with Social Impact.

Dr R V Ramani

A Doctor's Journey that started in Karnataka to build a National Organisation.

Dr R V Ramani

Dr R V Ramani, Founder and Managing Trustee of Sri Kanchi Kamakoti Medical Trust (SKKMT) and Sankara Eye Foundation India (SEFI), Padma Shri awardee, stands as a steward of transformation and a catalyst for change in community eye care across India. Alongside Dr Radha Ramani, the path from a modest Memorial Clinic in Coimbatore to a network of super-speciality eye hospitals over nearly five decades exemplifies the transformative potential of vision, service, and leadership.

Born and educated in Coimbatore, Dr Ramani completed his medical graduation at Kasturba Medical College, Manipal and Mangalore, where he was named the best outgoing student. Along with his wife Dr. Radha Ramani he established a memorial clinic after his late Father in the year 1972. In a short period of time, they were recognized among the highly successful medical professionals of Coimbatore.

Inspired by the guidance of the Sankaracharyas of Kanchi, Dr Ramani and Dr Radha Ramani established the Sankara movement in 1977. Their guiding principle remains: *"Paropakarartham idam sareeram" – Service to humanity is service to God.*

"In 1977, with 5 Rupees one could buy 2 Kgs of rice or few kilograms of vegetables, may be a litre of petrol, this also covered a visit to the doctor and handful of medicines. In 1977, all we needed was Rs.5 to start a dream - a dream called "Sankara", which was nurtured by friends who trusted us and a divine grace which guides us even today," as shared by Dr R V Ramani

Recognising health a fundamental human right and attainable social goal, Dr Ramani championed the cause of community healthcare, soon identifying eye care as a speciality where needs were immense.
Supported by philanthropic contributions and a collective spirit, the early phase saw a rapid expansion from a single centre in a 100 square foot room with 10 volunteers, to a citywide voluntary network. In 1981, Sankaracharya advised and blessed the formation of Sri Kanchi Kamakoti Medical Trust as a public charitable trust to take forward the healthcare activities.

A pivotal donation of land on Sathy Road served as the foundation for what would eventually become a 500-bed super speciality eye hospital-planned and built brick by brick - with clear goals and a unified mission.

From its humble beginnings, Sankara has grown into a beacon of community eye care, serving more than 20,000 villages across ten Indian states with fourteen hospitals and forty one Vision Centres. Programmes such as the "Gift of Vision", rural outreach eye care programme, "Rainbow"-preventive care initiatives for children, and diabetic retinopathy screening have become cornerstones of its impact.

Leadership Lessons from the Sankara Journey

Dr Ramani's leadership embodies several core principles that underpin the sustained growth and reputation of Sankara:

Clear Vision & Purpose as a compass

Even at the time of starting the Institution, the overall infrastructure was well planned and the goals and

objectives were laid down without any ambiguity. We did not have funds but built an architect's perspective of how the hospital would look after 15 years.

The reality of health care in India is that while we have the world's largest youth population, we also have a large part of our population who are ageing. Many institutions and cities are a destination for medical tourism and at the same time healthcare is inaccessible at times for the rural & underprivileged.

The DNA of Sankara is "Community Eye Care"- to provide high quality, cost effective and readily available eye care at the doorsteps of rural India. Over the years while sustainability has become critical, every decision of ours is taken with a filter of us not just being an eye hospital but a social movement and how it enables out vision of eliminating needless blindness in our country irrespective of socio economic status of the patient.

Fostering a Culture:

A palpable sense of pride and belonging characterises the "Sankara Culture." New employees are mentored and introduced to patient stories, instilling empathy and unwavering commitment to ethical practices as essential values.

Every doctor is made to understand that at the other end of the microscope is not just a patient with cataract or any other ocular condition, but actually someone's father, mother, wife, husband or grandparent. For a particular patient, this one intervention could be the difference between darkness and light. The responsibility to ensure the highest quality of care becomes critical and no short cuts are acceptable.

If today, over 3000 employees of Sankara Eye Foundation across the country have all imbibed with a sense of pride, ownership and total commitment, it has been the outcome of instilling values over the past 5 decades.

Sustaining Social Enterprise – The 80:20 Model:

We are fortunate to have well - wishers who support us with contributions towards the capital costs. Our operating value creation model is a unique 80:20 financial model which guarantees sustainability: 80% of patients from rural, underserved backgrounds are treated free of charge, subsidised by the positive revenue generated by 20% of paying patients.

Patients pay what is on par with the market, with the strong use of data, a focus on productivity and leveraging economies of scale, this well-structured approach underlines the possibility of scaling high-quality, affordable eye care across India.

Community-Driven Philosophy:

Dr Ramani likens organisation building to a village uniting to move a temple cart forward. "In every temple in our country, there is an annual cart festival in which the entire village come together to pull the deity. Similarly, for Sankara to have grown, the journey is rooted in collective effort, voluntary participation, and deep engagement from all our team members, donors, partners, the Government and other stakeholders".
With an organised approach to serve a need-based

cause and with the perseverance of over 49 years, this movement has taken shape. The community all over the country and the corporates as their CSR initiatives have come forward to support the Organisation.

International support, especially through the Sankara Eye Foundation USA that has volunteers of Indian origin has facilitated replication and expansion, with new hospitals inaugurated each year and further growth planned for regions such as at Patna.

Investing in Human Capital:

Most often medical training is like the story of Ekalavya. Students are expected to observe and perform with little hand holding. We have combined exposure to the patient load and equipment to develop diagnostic and clinical skills through teaching modules and mentorship. Today our wetlab including surgical simulators sets up the trainee to be better prepared the very first time they are handling a patient.

Through Sankara Academy of Vision, we have over the years looked at continuous professional development, including Fellowships, Ophthalmic technician training for rural girls, and postgraduate education integral to Sankara's continued excellence and high staff retention.

Values Above All:

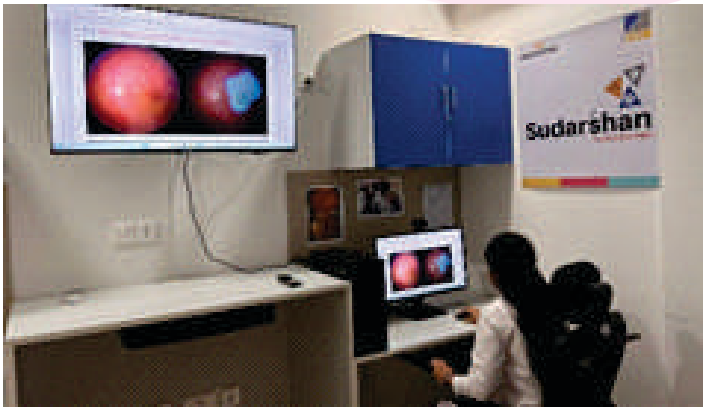
Compassion, patient-centredness, integrity, and relentless pursuit of quality define the Sankara movement. The commitment of serving every patient compassionately, underpins every initiative and inspires all members of Team Sankara.

Institutionalising Second-Line Leadership:

A strong second line of home-grown leaders has been nurtured through a dedicated Leadership Council, comprising Presidents for Medical Administration, Quality and Training, and Operations. This approach enhances continuity and paves the way for the next generation of values-driven leaders.

Innovation, Research, and Expansion

In the 1990s, Dr JK Reddy and Dr JC Reddy questioned why SICS cannot be done through a temporal section and this made a big difference to the delivery of cataract surgery through community eye care.



Sankara Eye Foundation has championed eye banking, corneal transplantation techniques from DALK to CAIRs, and use of technology including tele-ophthalmology to connect vision centres to base hospitals and even leverage AI for screening, ensuring care reaches the nation's remotest corners. “we are proud to share that our solution for DR Screening through AI was recognized by the Government of India as part of the 75th Independence Day commemoration as among the 75 solutions for social impact”.
Research and Innovation operate through the research office of the Sankara Academy of Vision, which also serves as the academic hub for training the next generation of eye care professionals.

National Recognition

Reflecting on the organisation's commitment to excellence, Dr Ramani has received numerous accolades, including oration awards from the Bangalore Ophthalmic Society, Kerala Society of Ophthalmic Surgeons & Andhra Pradesh Ophthalmological Society.

Dr Ramani was awarded the Padma Shri in the year 2019 by the Government of India and appointed by Government of India as a Board of Governor in Super session of Medical Council of India (MCI).

He was recognized by Quality Champion Platinum Award 2022 from Quality Council of India and has been awarded from the Indian Chamber of Commerce, CII and FICCI.

More recently, Dr Ramani was nominated as the President of All India Institute of Medical Sciences (AIIMS), Raebareli, UP, in August 2025.

Team Sankara continues to pursue excellence in the chosen field and strengthen the organisation, this World class Eye Care with a Social Impact. **The organisation has been recognized as among the top 10 eye hospital networks in the country and also among the top 10 not for profit organisation in 2024.**

A Lasting Legacy - and Miles to Go

Today, the Sri Kanchi Kamakoti Medical Trust stands as a testament to the power of vision and values-led leadership. The Gift of Vision, outreach eye care programme, with the 14 hospitals and the 41 vision centres have ensured that high quality eye health is not defined by where one resides. Our hospital **RJ Sankara Eye Hospital at Varanasi was inaugurated amongst others by the Honourable Prime Minister of India Shri Narendra Modi.**

With millions of lives touched - children seeing their first rainbow, artisans returning to their crafts, and elders cherishing family moments anew - the Sankara story continues to be written. The journey is anchored in tradition, driven by service, and guided by forward-thinking leadership principles that aspiring medical professionals and institutions across India would do well to emulate.

Miles to go Lighting the Lives of the Millions.

In every corner of India, someone today is seeing the world clearly because of Sankara.

A grandfather and grandmother happily watching their grandson walking to school.

A mother who weaves again in her Weaver shala after years of Visual impairment.

A child who sees the blackboard clearly for the first time and merrily enjoys the colours of the Rainbow, butterfly and the blossoming flowers. This is the legacy of Sankara Eye Foundation India.

49 years of turning darkness into light. Sankara-the movement that started with just five rupees-continues to turn darkness into light, every single day.

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Evolving Technology for Eye Care in Low-Middle-Income-Countries and India: Current Landscape and the Way Forward

Dr B R Shamanna
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Introduction

Eye care remains a significant public health challenge in low-and-middle-income countries (LMICs)[1], where barriers such as limited infrastructure, shortage of trained professionals, and financial constraints hinder the delivery of quality ophthalmic services. In addition, the aspects related to availability, accessibility, affordability, accountability and acceptability are issues that are determined more by the socio-economic and cultural milieu that exists within these countries. However, the rapid evolution of technology is transforming the landscape of eye care in these regions, offering new solutions to age-old burgeoning problems. Particularly in India, with its vast and diverse population, there is a significant challenge in providing comprehensive eye care to all its citizens. However, technological advancements are rapidly transforming the landscape of ophthalmology and optometry in the country. From the integration of artificial intelligence (AI) to the proliferation of telemedicine, technology is bridging gaps in access, affordability, and quality of eye care.

The Current State of Eye Care in LMICs and India

Eye care is a crucial component of public health, providing essential services that help prevent blindness and visual impairment. In low- and middle-income countries (LMICs)[1], the burden of eye diseases remains disproportionately high, with millions affected by preventable or treatable conditions. LMICs bear a significant share of global visual impairment. Conditions such as cataract, refractive errors, glaucoma, diabetic retinopathy, and trachoma are common.

India is home to the largest number of blind and visually impaired people in the world. Cataract, uncorrected refractive errors, glaucoma, diabetic retinopathy, and corneal blindness are among the leading causes[2]. The gaps in quality of services expected and delivered has further compounded the problem. While, urban centres often have access to world-class eye care facilities, rural and remote regions continue to struggle with inadequate infrastructure and equipment with a shortage of trained professionals.

Broad challenges in eye care delivery in LMICs and India[3]

Limited Access to Services:

Rural and underserved communities frequently lack specialised eye care providers and facilities. Many regions have a severe shortage or maldistribution of specialised eye care personnel and trained support staff.

Affordability and Financial Barriers:

Out-of-pocket expenses for consultations, surgeries (such as cataract removal), and corrective devices (like spectacles) often deter individuals from seeking care, especially among poorer populations.

Inadequate and poorly equipped infrastructure:

Eye hospitals and clinics are often concentrated in urban centres, leaving rural areas underserved. Equipment for diagnosis and treatment may be lacking, outdated or unavailable.

Lack of Awareness:

Public awareness of eye health and available services is low, leading to delayed presentation and treatment. Compliance to treatment modalities and mechanisms to ensure that it happens are still evolving.

Integration with General Health Services:

Eye care is sometimes not well integrated into primary health care, resulting in missed opportunities for early detection and intervention.

Recent Technological Advancements in Eye Care

Technological innovation is paving the way for accessible, affordable, and efficient eye care in resource-limited settings. Some key advancements include:

1. Portable Diagnostic Devices

Portable and smartphone-based diagnostic tools have revolutionised screening and diagnosis. Devices such as handheld fundus cameras, autorefractors, and slit lamps enable primary care workers to conduct eye exams in remote areas and mass application including outside the traditional systems. Smartphone adapters can now capture high-resolution retinal images, which

can be transmitted to specialists for remote diagnosis (tele-ophthalmology).

2. Artificial Intelligence (AI) and Machine Learning

AI-powered algorithms can analyse retinal images to detect conditions such as diabetic retinopathy, glaucoma, and age-related macular degeneration. These systems reduce reliance on highly specialised professionals and allow faster more widespread screening. The ability of these to analyse large volumes of patient data quickly and accurately, help in early detection and timely referral.

3. Telemedicine and Tele-ophthalmology

Telemedicine platforms connect patients in rural areas with urban specialists, overcoming geographical barriers. Video consultations, remote image sharing, and live diagnostic support are increasingly used in community health programmes, improving the reach of eye care services. Mobile screening vans equipped with fundus cameras and internet connectivity are reaching underserved areas, allowing for real-time diagnosis and follow-up. They have reduced both direct and indirect costs and ensured time savings for the end users. They have enhanced follow up and compliance among the service users as well.

4. Low-cost Surgical Innovations and precision tools

Innovations like the manual small incision cataract surgery (MSICS) technique and affordable intraocular lenses (IOLs) have made cataract surgery accessible to millions. Mobile surgical units and outreach camps further facilitate service delivery in underserved areas. Modern robotics and laser-assisted surgeries techniques like femtosecond laser-assisted cataract surgery and robotic-assisted procedures, are enhancing precision and outcomes for patients undergoing complex eye surgeries.

5. Digital Health Records and Data Management

Digital platforms for patient records and eye health data management enhance continuity of care, track epidemiological trends, and streamline service delivery. Electronic Medical/Health Records (EMR/EHR) leading to digitalisation of patient records has improved continuity of care, reduced errors, and facilitated population health management. Cloud-based systems are currently being adopted by leading eye hospitals in India.

Portable eye examination kits and smartphone-based vision testing have been deployed in various community outreach programmes, enabling early detection of eye diseases in African context. Several Indian institutions and start-ups[4] are at the forefront of integrating technology into eye care like process innovation and technology, implanting AI-based screening for sight threatening eye diseases and better management, including development of affordable, portable retinal imaging devices that are being used extensively in rural outreach programmes.

Challenges, Limitations and Barriers in technology development and adoption

Digital Divide:

Limited internet connectivity and lack of digital literacy can hinder technology adoption. Poor internet connectivity in remote areas hampers telemedicine and teleophthalmology. Lack of awareness and digital literacy among patients and health workers will also act as a barrier to the successful adoption of technology.

Development Costs:

Investment in the development of technology and the need for higher initial costs of advanced diagnostic and surgical equipment can deter and delay its development.

Quality Assurance:

Ensuring the accuracy and reliability of AI algorithms and portable devices is critical.

Data Privacy:

Safeguarding patient data and ensuring ethical use of health information is essential. Regulations and legislations[5] related to personal data protection and privacy should also be considered as a mandatory ethical and compliance requirement.

Sustainability:

Long-term maintenance, funding, and local capacity building are required for sustained impact.

The Way Forward

To ensure that technology-driven eye care reaches every corner of LMICs and India, a multi-pronged approach is essential:

Strengthening Public-Private Partnerships:

Collaboration between government agencies, private sector, NGOs, and technology development companies can scale up innovative models for mass screening and treatment.

Capacity Building:
Training health workers, optometrists and key health and non-health functionaries in the use of new tools and platforms will help bridge the human resource gap.

Investing in Affordable Technology:
Continued support for indigenous research and manufacturing can reduce costs and promote self-reliance. The Indian governments "Make in India" pitch and access to resources is a great boon for technology development. This was evident during the time of the pandemic.

Digital Infrastructure Development:
Expanding reliable internet connectivity and cloud infrastructure, especially in rural regions, will support remote diagnostics and teleconsultations.

Policy and Regulatory Support:
Streamlining approvals for new technologies, standardising data privacy norms, and incentivising innovation will accelerate adoption across the country.

Awareness Campaigns:
Mass media, community outreach, and school health initiatives can educate people about the importance of regular eye check-ups and the availability of technology-enabled services.

Impact and Benefits expected

- Increased accessibility to eye care services, especially in remote and underserved locations.
- Reduction in avoidable blindness through early detection and timely intervention.
- Cost-effective solutions that are sustainable in resource-limited settings.
- Cost and time savings to the end user
- Empowerment of community health workers through training and technology integration.

Conclusion
Technology has the potential to revolutionise eye care delivery in LMICs and India by making it more accessible, affordable, and effective. Technological advancements are redefining the possibilities for eye care delivery in low-and middle-income countries. By leveraging portable diagnostics, AI, telemedicine, and digital health records, these regions can overcome traditional barriers to eye health. Continued investment, innovation, and collaboration will be key to ensuring that the benefits of evolving technology reach every individual in need. By embracing innovation and addressing existing barriers, these countries can move closer to eliminating avoidable blindness and ensuring healthy vision for all its citizens. The journey forward will require collective action, robust investment, and a commitment to leveraging technology for social good.

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Keratoprosthesis: the last resort for corneal blindness

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Keratoprosthesis is the final resort for eyes with end-stage ocular surface disorders and in those at a high risk for conventional penetrating keratoplasty. This surgery has come a long way in the last 3–4 decades since Prof. Dohlman designed the first KPro in 1992. Various materials have been explored for the haptic component, while the optic design has largely remained unchanged. Dr. F. Pintucci and Dr. Strampelli of Italy developed bio integrated haptics. Later, Dr. S. Pintucci refined the Pintucci Keratoprosthesis, and Dr. Falcinelli designed and popularized the Osteo-Odonto Keratoprosthesis (OOKP). The International Keratoprosthesis Society meets regularly, where research scientists and keratoprosthesis surgeons interact and come up with new ideas. Prof. Dohlman's original design — the Dohlman-Doane keratoprosthesis, popularly called the Boston keratoprosthesis — has also been modified mainly by his colleagues and students at the Massachusetts Eye and Ear Infirmary (MEEI), with a resurgence of interest in the design worldwide in the last decade. This can be attributed to the drastic drop-in infection rates following the use of lifelong vancomycin drops and a large-diameter scleral bandage lens changed at regular intervals. The Aravind Eye Care System, based in Madurai, manufactures Type 1 keratoprostheses for use in Indian patients since 2008. Prof. Antony Aldave from California has trained a lot of Indian corneal surgeons who have been performing this surgery (Type 1) at an affordable price and have demonstrated good results in selected cases.

The choice of keratoprosthesis (KPro) depends on the underlying etiology, the anatomy of the ocular surface, and the tear film status. Broadly speaking, keratoprostheses are categorized into Type 1 and Type 2 KPros depending on the specific type of eye being treated. Broadly, eyes with normal lids, intact blink, and tear film, without an underlying immunological etiology, are considered as candidates for the Type 1 KPro, the prototype of which is the Boston Type 1 KPro. However, in severe dry eyes or keratinized ocular surfaces with an underlying immunological disorder, associated with lid abnormalities, Type 2 Boston KPro and Modified Osteo-Odonto Keratoprosthesis (MOOKP) are considered as the treatment options. Decision-making, therefore, is one of the most important aspects of KPro surgery in selecting appropriate patients for KPro, but also in choosing the correct type of KPro, which plays a crucial role in achieving a successful outcome.

Although the indications have expanded significantly over the years and the complications have reduced due to improvement in design and postoperative management, these are procedures that require commitment towards long-term follow-up and diligent post-KPro care. It needs a different mental make-up than that needed for routine cataract surgery. Patient counselling is of paramount importance. Patients should be advised to report immediately if any discomfort arises so that the complications can be promptly addressed, ensuring a better outcome. Timely management of complications is crucial for the long-term survival of the KPro in the patient's sole functioning eye.

A heart-warming incident that I would like to share: a corneal-blind lady with severely vascularized corneal opacity in both eyes had resigned herself to her condition and had even purchased a cane. Following KPro surgery, she no longer needed a cane and returned home with visual acuity of 6/9. She has maintained the same vision for the past five years to date.

The last decade has seen a surge in the number of KPro procedures performed worldwide, including in India. There is a growing need for ophthalmologists in our country to be aware of the indications for KPro to facilitate appropriate referral as well as to understand the procedure sufficiently to perform basic evaluation during follow-up if required. For corneal specialists interested in pursuing it, it is essential to understand the nuances of these surgeries and to make judicious decisions regarding patient selection and, more importantly, when to defer surgery.

Research actively continues on the Boston keratoprosthesis to improve design and outcomes and to expand indications for its use. KPro patients are prone to develop inflammation, retroprosthetic membrane (RPM), and cellular debris within and around the PMMA back plate, and studies are

investigating alternative keratoprosthesis materials, including titanium. The optimal management of glaucoma and other projects aimed at accurately assessing IOP in KPro eyes utilizing intraocular pressure transducers with telemetry capabilities are under study. Extensive research is ongoing on the Boston KPro and MOOKP to address existing challenges and develop improved designs. It is hoped that more Indian-made models will become available at affordable prices, enabling many bilaterally corneal-blind patients who are otherwise unfit for keratoplasty to regain vision through this surgery.

Let us make the corneal blind see again.

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When our patient develops endophthalmitis…

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In one's lifetime as an ophthalmic surgeon, there is a high probability of one of our post-surgery patients will develop endophthalmitis and we will have to deal with it. While endophthalmitis is fortunately rare, occurrence of the same in one of our post operative patients is a deeply disturbing experience. Let us explore what we can do to cope up with the situation and minimize collateral damage.

When faced with a one-day post-op patient presenting with hypopyon, most often we would want to believe that it is indeed toxic anterior segment syndrome and treat the patient appropriately. What we need to understand is that a virulent organism such as pseudomonas can cause fulminant endophthalmitis and institution of prompt treatment is the only way to try salvaging the eye. Symptoms and signs that may indicate an infective endophthalmitis are:

1. Decreased vision - - in a patient who had undergone cataract surgery under topical anesthesia. Absence of pain does not rule out endophthalmitis and should not be relied upon to rule out endophthalmitis

2. Lid edema – unusual edema of the upper lid in a post-op patient who had undergone an uncomplicated cataract surgery

3. Circumcorneal congestion along with conjunctival congestion

4. Corneal edema not extending from limbus to limbus

5. Cellular reaction in the anterior chamber with or without hypopyon and inflammatory membranes in the anterior chamber. Wound infiltration / abnormality may also be seen

6. Hazy or poor fundus view.

What next:

We need to document vision of the patient – necessary from a medicolegal view point and also to help decide if the patient should be treated with tap and inject or vitrectomy.

If TASS is a high probability, we can admit the patient and treat with intense topical steroids and review the patient ½ to 1 hourly. Worsening will indicate a high probability of infective endophthalmitis.

If there are signs suggestive of infective endophthalmitis or worsening with topical steroids, the next step is to obtain specimen for identification of the organism. An anterior chamber tap is easily done and the specimen is sent for smear and culture. One can also consider a conjunctival swab and also confirm that the ROPLAS is negative.

We would then administer ½ hourly topical antibiotics, one with gram +ve coverage and the other for gram -ve coverage (moxifloxacin 30mg/ml & tobramycin or amikacin 20mg/ml, 4 hourly or more), topical steroid and cycloplegics are also administered. In the acute post-op setting, the infection is more often bacterial and topical antibiotics and steroid would be appropriate. However, if there is a suspicion of fungal etiology, topical anti fungals may also be administered while minimizing topical steroid usage.

Topical therapy may alone suffice in patients presenting early with mild disease – we will be able to see retinal details in these patients, the anterior segment showing a streak hypopyon and vision measurable on the Snellen vision chart.

In those with more advanced signs and symptoms that above, it is preferable to administer intravitreal antibiotics with intravitreal dexamethasone frequent (Vancomycin 1mg/0.1ml + amikacin 0.4mg/0.1ml or Vancomycin 1mg/0.1ml + ceftazidime 2.25mg/0.1ml & dexamethasone 400micrograms). While this is the antibiotic combination suggested by the EVS study, current research from India suggests using more suitable antibiotics considering the high probability of gram negative infections in acute post-op endophthalmitis.[1,2]
If fungal etiology is suspected, intravitreal steroids may

be withheld and the patient is treated with intravitreal anti fungals.

Other antibiotics and antifungals

1. **Antibiotics**
    - Moxifloxacin – 100-200mcg
    - Linezolid – 400mcg
    - Piperacillin / Tazobactum – 225mcg
    - Colistin – 1000 IU
2. **Antifungals**
    - Voriconazole – 100mcg
    - Amphotericin B – 5mcg

The patient is then monitored on at least a 6 hourly schedule to ensure that there is no worsening of the disease.

In patients who present with <HMCF vision, vitrectomy is a preferable option and the patient can be referred to the vitreous surgeon at the earliest, after administering one dose of intravitreal antibiotic.

The intravitreal injections are repeated once in 48 hours, taking care to check the smear and culture report and modify the antibiotic regimen, based on the same. A repeat intravitreal may be withheld in patients showing dramatic improvement with clearing of the anterior and posterior segment exudates – in which case the patient can be treated with only topical medications.

Topical antibiotics may be necessary for at least 2-4 weeks, the intensity of administration tapered off after the first 24 hours, in a patient who is responding to treatment. Topical steroid is also tapered off after the first 24 hour intense phase.

Systemic antibiotics are preferably given if it is a gram negative infection and also if the patient is a diabetic.

- **Parenteral**
    - Ceftazidime + Garamycin / Amikacin
    - cefazoline, ceftriaxone
    - Linezolid
    - Vancomycin
    - Imipenem / Meropenem
- **Oral**
    - Moxifloxacin / Gatifloxacin
    - Trimethoprim-sulfamethoxazole

Oral steroids 30mg/day for 5-7 days may also be administered in bacterial endophthalmitis.

It is preferable to initiate the topical and intravitreal treatment once the anterior chamber tap is obtained and also involve a vitreoretinal surgeon in patient's care.

Investigating the cause of acute post operative endophthalmitis:

Once we have a patient with post-op endophthalmitis, it is essential to perform a root cause analysis for the safety of our other patients and also ourselves. While the conjunctival flora or other factors such as poor hygiene, infective focus in the adnexa may be the cause, an acute fulminant endophthalmitis is most often caused by extraneous factors. It is imperative to identify the same and address it immediately. Patient related factors can be identified on careful examination of the patient and obtaining culture from areas such as the conjunctival cul-de-sac, nasal cavity, etc.,

While sterilization failure may be a cause of endophthalmitis, it is a rare cause, except in cases of poor maintenance and sterilization of bored (instruments with a bore - ex: phaco probe) instruments where in a nidus may form within the bore, invisible to examination and occasionally cause an infection. With current sterilization protocols being followed such as universal usage of sterilization indicators and following established sterilization methods, sterilization failure is rare cause.

Acute fulminant endophthalmitis is most often due to consumables, notably the irrigation fluid.[3] Other consumables such as viscoelastic, topical eye drops, including the topical anaesthetic eye drops, solution used to store the intraocular lens, dyes, intracameral injections and even povidone iodine eye drops have been known to be contaminated and cause endophthalmitis.[4-6]

Hence, it is preferable to send the residual fluid, eye drops, viscoelastic and other consumables, if not discarded for culture – if the same organism isolated from the ocular fluids is identified in any of the consumables, the source of infection becomes apparent.

One other common cause is the surgical equipment such as phacoemulsifier with contamination of internal fluid spathways.[7,8]

It is preferable to have the equipment inspected and serviced with the intention to eradicate this as a cause of infection.

Yet another often overlooked cause is the contaminated air conditioning system which can cause an occasional infective endophthalmitis or a cluster.[9,10] It is preferable to inspect and service the same. Increased construction activity in the hospital is also associated with an increased risk of endophthalmitis due to release of spores from the walls.[11] One needs to have heightened vigilance during periods of construction activity in the hospital.

It is likely that the cause may go unidentified, but it is better use this opportunity to revisit all the protocols of the hospital and also scrutinize the crucial areas as detailed above for the safety of our subsequent patients and ourselves.

After having experienced a nightmare by operating one eye, yet another dreaded situation to face as a surgeon, is the fear to operate the fellow eye with cataract. This is quite natural. All precautions should be taken, like performing lacrimal sac syringing, conjunctival swab culture, taking adequate precautions in treating lid and adnexal infections, adequate and appropriate preoperative topical antibiotics, topical povidone iodine before and after surgery, good control of diabetes and appropriate counselling. It is better to postpone the surgery if the cataract Is not significant. But when it is time to operate, one has to face the situation boldly although one will be ruled by fear and apprehensions.

To conclude, immediate management of acute post operative endophthalmitis is very much within the purview of the anterior segment surgeon and it is also imperative to investigate the possible cause of endophthalmitis once acute care of the patient is complete.

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Three Decades in Pediatric Ophthalmology: Lessons in Building Systems and Teams

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Beginnings of a Journey (1990s)

I entered the field of pediatric ophthalmology at a time when it was still finding its identity in India. After completing my ophthalmology residency and fellowship in pediatric ophthalmology under Dr. P. Vijayalakshmi at Aravind Eye Hospital, Madurai, I was drawn to the transformative impact of restoring sight early in life. In 1997, I moved to Aravind Eye Hospital in Coimbatore to establish pediatric ophthalmology services for a population of nearly 1.3 million, becoming the region's first dedicated specialist in this field. Short training stints at Johns Hopkins, Wills Eye Hospital, Boston Children's Hospital, and the Jules Stein Eye Institute broadened my perspective and reaffirmed the need to build comprehensive, system-based pediatric eye care in India.

Those early years were both challenging and formative. I was a clinician, surgeon, educator, and administrator, often on the same day. A one-person service slowly became a multidisciplinary department. The guidance of Dr. G. Venkataswamy, Aravind's founder, was a constant compass. His belief that quality and compassion must go hand-in-hand continues to guide our work today.

Growing a Regional Center of Excellence

Over the next two decades, the pediatric unit in Coimbatore grew from a fledgling unit to a comprehensive department with eight consultants, supported by skilled allied ophthalmic personnel (AOPs), orthoptists, anesthetists, and counselors. We transformed a small clinic into a child-friendly environment with colorful walls, toys, and specialized equipment for kids. Gaining the trust of the community was crucial; over time, word spread that children with eye problems finally had a place to go.

The numbers show what the community built with us. From modest beginnings, we now conduct over 23,000 outpatient pediatric examinations annually and perform more than 1,300 pediatric surgeries each year. These surgeries range from cataract extractions in infants to complex strabismus corrections. Each figure stands for a child and a family. The system did not appear on its own. It grew through deliberate capacity building, child-specific protocols, and a focus on quality at scale that reflects the Aravind model.

Pioneering Programs: ROP and Pediatric Retina

In 2000, we began screening premature infants for retinopathy of prematurity (ROP), one of India's first structured ROP programs with the guidance of Dr. Robert Petersen Childrens hospital, Boston Over time, it evolved into a regional network spanning more than 100 NICUs, screening over 18,000 infants and treating hundreds for sight-threatening disease.

Two USAID-supported projects (2014–2016 and 2021–2023) transformed this initiative by integrating tele-screening, low-cost smartphone imaging, and AI-assisted grading into neonatal care. In the first phase we screened 7,299 infants across 59 rural NICUs. In the second we screened more than 18,000 babies across more than 100 NICUs, with rapid referral for those who needed treatment. AI-based image analysis reduced physician grading time by nearly 60% and helped triage even in remote units.

The model's reach now extends to a population of over 50 million, preventing blindness and building capacity through national and international fellowships in pediatric retina. Looking back, that early decision to focus on ROP shaped a sustainable public-health system for blindness prevention, combining screening, treatment, technology, and training.

Reaching Out: Community Projects and Outreach

From early on, we knew that a durable system had to extend beyond hospital walls. With Aravind's support, our team ran several community programs that treated childhood blindness as a public-health priority. The first USAID-supported project (2014–2016) focused on low vision and early intervention. Working in schools for the blind, rural classrooms, and village health centers, we trained teachers and special educators to identify vision problems and refer children for care. Over 1,000 children with uncorrected refractive errors received on-site glasses, while those with irreversible vision loss were provided with low-vision devices and family-based early-intervention training. Adding rehabilitation specialists changed the trajectory for many children with cortical visual impairment by improving functional vision and independence at home.

A second USAID project (2021–2023) targeted elimination of pediatric cataract blindness across Tamil

Nadu. Through a multi-pronged approach of school screenings, workforce training, and public awareness, we trained over 1,000 frontline workers and teachers to identify eye problems in children. In just two years, nearly 700,000 children were screened in schools and anganwadi centers, with timely referral for surgery and follow-up. Simultaneously, ophthalmologists from other districts were trained to perform pediatric cataract surgeries closer to home.

Beyond the counts, these projects created a network of sentinels who continue to identify and refer children. That is how systems last. This, to me, is the essence of system-building: enabling others to carry forward a shared mission of preventing avoidable childhood blindness.

Expanding Services: Myopia, Amblyopia, and CVI Care

As patterns of disease changed, our services evolved. Rising childhood myopia led us to launch a Myopia Management Centre, the first in our region, with structured counseling, low-dose atropine, and axial-length monitoring

To address persistent amblyopia, we built an Amblyopia and Binocular Vision Clinic that combines traditional patching with digital dichoptic therapy. Game-based tools improved compliance and outcomes because therapy became engaging.

More recently, the Tele-CVI Clinic has enabled remote care for children with cerebral visual impairment, a growing cause of developmental blindness. Through multidisciplinary collaboration—including low-vision specialists and therapists—families in rural areas can now access individualized vision-stimulation plans from their homes.

Training the Next Generation of Specialists

Mentoring has been the most rewarding part of my work. Since the early 2000s, I have helped design and lead Aravind fellowships that have trained more than 75 Indian ophthalmologists. Many now lead pediatric services across the country. Each fellow who becomes a trainer multiplies the impact.

Our capacity building also crosses borders. More than a dozen international fellows from Tanzania, Nigeria, Sri Lanka, Uganda, and Italy have trained with us. Some established the first pediatric ophthalmology or ROP services in their countries. Training outlives projects and changes institutions. These stories affirm that training is the most enduring form of service, one that transforms institutions long after a project ends.

Beyond Aravind: Building Institutions and Partnerships

The Aravind philosophy prizes systems that can be shared and scaled. In 2007, I helped establish Sudarshan Netralaya in Amreli, Gujarat, Aravind's first managed hospital in western India, where we set pediatric protocols and trained local teams.

A decade later we supported a similar effort outside India. In partnership with the Tulsi Chanrai Foundation, Aravind helped launch a high-volume eye hospital in Abuja, Nigeria, in 2018. Our team trained Nigerian ophthalmologists and nurses in pediatric cataract surgery and service organization. Seeing the Chanrai-Aravind Eye Hospital open, and now serve tens of thousands each year, was humbling. Good systems travel well.

The Power of Teams and Human-Centered Leadership

Programs endure because teams do. From the start, we invested in AOPs, orthoptists, anaesthetic assistants, and counselors, many of whom have grown with the department for more than two decades.

Small acts change clinical encounters with children. A rhyme can calm a frightened toddler. A cartoon can turn an exam into play. Adding early-intervention therapists ensured that children with developmental delays received continuous visual stimulation and educational support.

Leadership, I have learned, is about creating the conditions for people to thrive. Regular open meetings where every team member can suggest ideas have sparked many small innovations that matter to families.

Mentors, Inspirations, and Gratitude

No journey is solitary. I owe much to

Dr. G. Venkataswamy, whose philosophy of " Joy of doing something beautiful" remains the moral center of our work.[4] Dr. P. Vijayalakshmi, my mentor and teacher, modeled scientific rigor balanced with empathy and precision.[5] Internationally, Dr. Marilyn Miller profoundly influenced my global outlook. Her belief that every child, regardless of birthplace, deserves access to sight-saving care has reinforced my commitment to teaching and advocacy, which continues to echo through every fellowship program we run.[6]

Looking Ahead:
The Future of Pediatric Ophthalmology in LMICs

The future of pediatric ophthalmology in low- and

middle-income countries is both promising and challenging. Preventable causes like congenital cataract and ROP are better controlled, but new epidemics, particularly childhood myopia, demand proactive systems for prevention. As neonatal survival improves, ROP screening must reach smaller towns and peripheral NICUs.

Technology will accelerate these efforts. Tele-ophthalmology, AI-based diagnostics, and virtual-reality rehabilitation hold immense potential, but they must be embedded within trained human systems. The goal should not be innovation for its own sake, but equitable access and measurable outcomes.

Workforce development remains the cornerstone. Many regions still lack a single pediatric ophthalmologist. Establishing training hubs in every state or country, modeled on the Aravind experience, could change that. Integrating eye health into child-health programs, school screening, and neonatal care will ensure early detection becomes the norm.

Above all, the ethos of human-centered, compassionate care must remain at the heart of all progress. Technology and policy can amplify our reach, but empathy sustains it.

Conclusion

As I look back on three decades, what stands out are not numbers but people, the babies whose sight was saved, the fellows who became mentors themselves, and the teams that turned ideas into enduring systems. What began as a single clinic in 1997 has grown into a living network that continues to evolve, teach, and serve.

This journey has taught me that pediatric ophthalmology is not only about curing blindness, but also about creating possibilities for children, their families, and their communities. The foundation is strong, and a new generation is ready to carry it forward with creativity and compassion.

If I have learned one enduring lesson, it is this: invest in people, commit to a vision, and never lose sight of why we began. In doing so, we do not merely build hospitals or programs; we build hope, one child's eye at a time.

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From Emmetropia To Clarity - A Review Of Five Steps Of Clinical Refraction

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Abstract

Purpose: To review the fundamental process of clinical refraction and its critical role in diagnosing and correcting lower-order optical aberrations in the human eye.

Design: Narrative review summarizing the scientific principles and clinical methodology of the refraction process.

Methods: A comprehensive review of the optical basis of refraction and the five-step clinical approach encompassing objective refraction, subjective correction, spherical refinement, cylindrical refinement, and binocular balancing was conducted. The review highlights standard techniques, common pitfalls, and interpretive nuances involved in accurate refractive assessment.

Conclusions: Refraction embodies both science and art within ophthalmic practice. A structured, stepwise approach enables clinicians to achieve optimal visual clarity and comfort for patients while minimizing diagnostic error. Mastery of each component step remains essential for ensuring accurate correction of ametropia in modern clinical ophthalmology.

Keywords: Refraction, Optics, objective refraction, subjective correction, emmetropia

Introduction

The optical system of emmetropic eye focuses parallel rays of light on the retina thus enabling a clear vision. Aberrations in this system induces the light to not focus on the retina. Usually they are lower order aberrations, which include myopia (positive defocus), Hypermetropia (negative defocus) or astigmatism (mismatched horizontal and vertical curvatures). These can be treated with glasses or contact lenses. Before treatment, diagnosing the aberration and the subtle art of refraction comes to play.

METHODS

Clinical Refraction includes 5 basic steps

1. Objective refraction
2. Subjective correction
3. Refining the sphere
4. Refining the cylinder
5. Binocular balancing

1- Objective Refraction

Method 1- Auto-Refractometry

An Auto refractometer works by projecting near-infrared light into the eye and measuring how it reflects off the fundus. The device uses an internal microprocessor to analyze the way the light rays change and focus as they enter and reflect from the eye's retina, using principles of retinoscopy and optometry to calculate the eye's refractive error. Hence the reading that we get from this machine can be used to enter the 2nd step

Method 2- Retinoscopy (Static)

Retinoscopy is an objective clinical technique used to measure the refractive error of the eye by observing the light reflex reflected from the retina through a handheld instrument called a retinoscope. It is particularly useful for young children, non-verbal patients, and those with communication difficulties as it allows the examiner to take readings with minimal patient co-operation

Performing static retinoscopy involves using a handheld retinoscope directly and manually adjusting lenses in front of the eye.

A. Prepare the Patient and Equipment

- Seat the patient comfortably at a distance of approximately 6 m from a stationary target on which the patient has to fixate
- Adjust the retinoscope to full arm length (67cm) which will be the working distance. 67cms the working distance corresponds to 1.50D.
- Hold lenses in front of the patient's eye

B. Position and Align

- Hold the retinoscope in your dominant hand, with the streak vertically oriented.
- Direct the streak into the patient's pupil along the visual axis.
- Keep your eye at the same level as the patient's eye, ensuring proper alignment and stability.

C. Observe the Reflex

- Shine the retinoscope light into the eye and observe the reflection from the retina.

- Note the movement of the reflex:
- With motion: reflex moves in the same direction as the streak.
- Against motion: reflex moves opposite to the streak.
- Note the brightness and clarity of the reflex as it moves.

D. Establish the Meridian of Measurement

- Move the streak horizontally, vertically and obliquely across the pupil to evauate the horizontal, vertical and oblique meridians respectively

E. Neutralize the Reflex

- Neutralize the Reflex with spherical trial lens:
- For hyperopia, add plus lenses until the reflex appears neutral (bright, broad, and steady).
- For myopia, add minus lenses to achieve the same.
- Make small adjustments and observe the reflex carefully.

F. Finalize the Measurement

Subtract the working distance diopters (67 cm = 1.50D) from the lens power to get the accurate spectacle correction In retinoscopy. The working distance of 67 is conventionally used because it corresponds to the typical arm length of the clinician, allowing for comfortable and stable examination posture. This distance creates a “working distance lens” equivalent to +1.50 diopters due to the reciprocal relationship between distance and lens

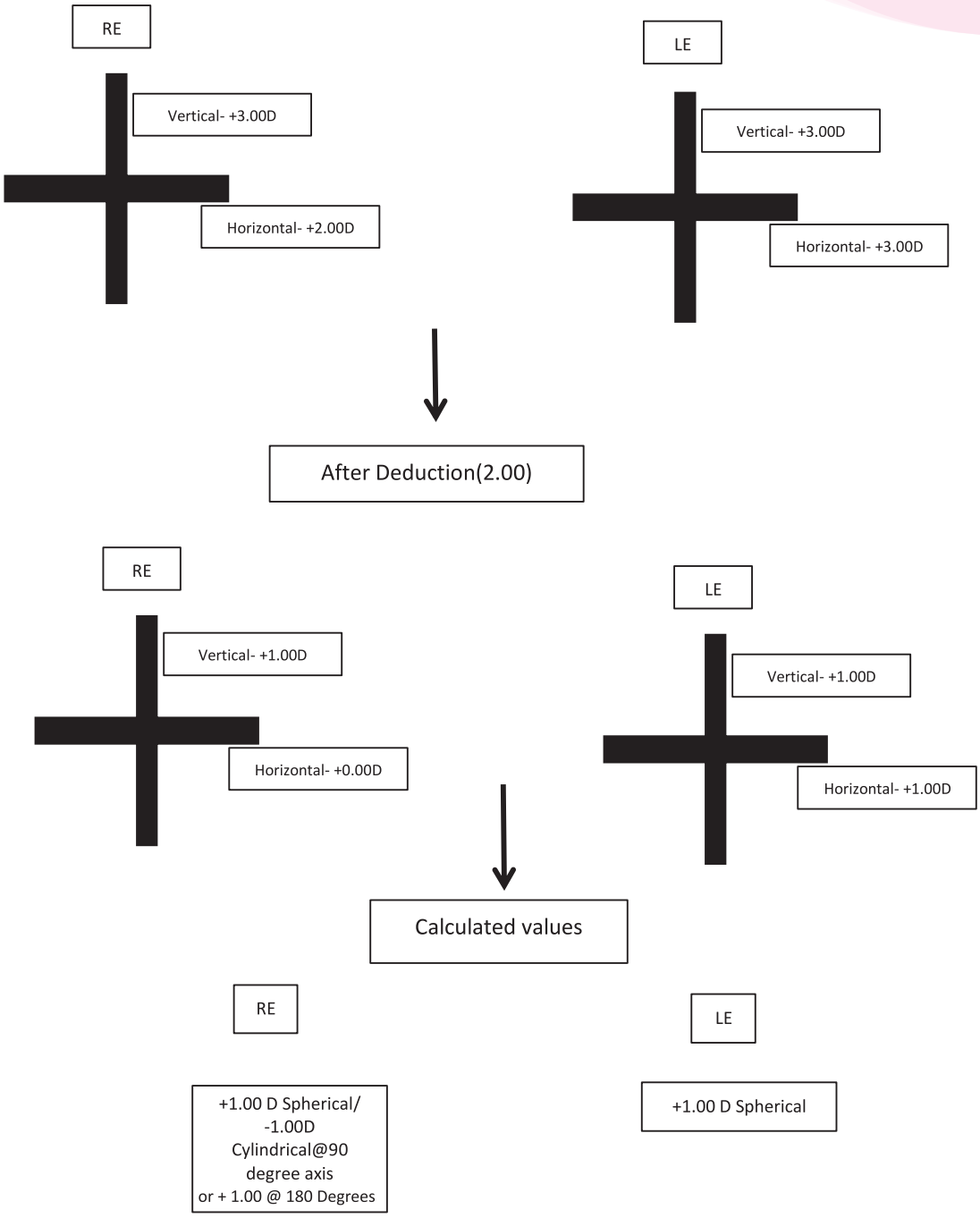
Cycloplegic agents:

such as atropine, cyclopentolate, and tropicamide - work by paralyzing the ciliary muscle, blocking the eye's ability to focus (accommodate) during an examination. Cycloplegia ensures that lens measurements reflect the true refractive status, undistorted by the patient's accommodation efforts. Cycloplegic refraction is the gold standard for evaluating refractive errors in children and adults with active accommodation. Properties of common cycloplegics used in OPD:

Agent	Typical Concentration	Onset of Action	Duration of Max Effect	Total Duration (Cycloplegia)	Cycloplegic Efficacy	Tonus Allowance (D)
Atropine	1%	30–40 min	1–3 hours	7–14 days	Most complete cycloplegia	1.00
Cyclopentolate	0.5% – 1%	20–45 min	30–60 min	24–36 hours	Nearly complete	0.75
Homatropine	2% – 5%	30–60 min	1–2 hours	1–2 days	Moderate	0.50
Tropicamide	0.5% – 1%	15–30 min	20–40 min	4–6 hours	Incomplete, mild residual accommodation	0.00

- **Tonus allowance** refers to the diopters subtracted from the retinoscopic finding to compensate for potential residual accommodation that may still influence the cycloplegic refraction.
- **Eg:** If Retinoscopic reading with manual Homatropine refraction reads +3.00, we have to subtract (working distance+tonus allowance=1.50+0.50) 2.00 from it before getting a reading

To explain with an example: assuming Homatropine refraction



To get to the corrected values of sphere and cylinder : Keep 1 of the deducted readings (horizontal/vertical) as spherical, here we have chosen +1, Subtract that reading from the other reading to get the cylindrical power i.e, 0.00 - (+1.00)= -1.00. keep the axis of the chosen cylinder

2. Subjective correction:

The patient may not accept the calculated objective refraction values, as it is dynamic process and accommodation plays a role. Trial and error combination of lenses are to be used subjectively to arrive at an optimal power for prescription

3- Refining the spherical power:

The duochrome test The duochrome test is a subjective method for refining spherical correction, based on the principle that red and green wavelengths focus slightly differently on the retina due to chromatic aberration.

➢ The patient views letters on a split red-green background through the subjective correction in a trial frame.

➢ If symbols on the green side appear clearer, the eye is under-corrected for hyperopia or overcorrected for myopia; if the red side is sharper, the eye is over-corrected for hyperopia or undercorrected for myopia.

{remember the Mnemonic RAM- red add minus/ GAP- green add plus}

➢ Adjust the lens power in 0.50 graduations till equal clarity on both R and G sides is achieved in each

eye, indicating ideal spherical correction.

➢ The duochrome test is especially valuable as it helps in minimizing over- or under-correction and enhancing visual performance with minimal accommodation.

4- Refining the Cylinder: The Jackson Cross Cylinder test (JCC)

JCC consists of equal plus and minus cylindrical powers oriented perpendicular to each other. (usually ±0.25/0.50 D) Basically it is a spherocylinder lens with its cylindrical power double that of its spherical power

Refine the power:

1. Place ±0.50 JCC with axis same as that of the axis obtained on subjective correction
2. Flip the JCC
3. Note the clearer vision amongst the 2 and add or decrease the cylindrical power accordingly

Refine the axis:

1. Fog the eye with +1.00 to relax the accommodation (VA will decrease to 6/12 or 6/18)
2. Place the JCC ±0.25 with axes 45 degree and 135 degree in front of the trial frame
3. Flip the JCC
4. Note the position of cleaer vision amongst the 2 and move the cylindrical axis towards the clearer side by 5-7 degrees

5- Binocular balancing

Binocular Balancing is performed after monocular subjective refraction to ensure both eyes exert the same accommodative effort, minimizing strain and preventing over-correction or unequal clarity between eyes

1. **Initial Fogging-**Add **+0.75D to +1.00D** sphere to both eyes. This fogs vision, forcing relaxation of accommodation. Ask the patient to keep looking at 6/12 or 6/18 snellens chart line
2. **Alternate Occlusion-**Rapidly and alternately cover each eye (using an occluder or by flipping the cover paddle), giving little time for the patient to accommodate between alternations. After each switch, ask **"Is the vision clearer in one eye or are they equally blurred?"**
3. **Equalizing Vision-** If the patient reports one eye is clearer, add **+0.25D** sphere to the clearer eye. Repeat the alternate occlusion and ask again; continue adding +0.25D to the clearer eye as needed, until the patient reports both eyes are equally blurred.
4. **Reducing Fog (Unfogging)-** Once equal blur is achieved, **reduce the plus power ("unfog") both eyes in 0.25D steps, together**, until the patient reaches best binocular visual acuity (the line they could read monocularly). Settle on the **maximum plus (or minimum minus) prescription that allows best binocular vision**.
5. **Confirm and Finalize-** Double-check by performing another round of rapid alternate occlusion to confirm equal clarity in both eyes.

Conclusion:

Clinical refraction is an essential process that combines objective measurements with subjective patient feedback to accurately identify and correct refractive errors. By systematically refining sphere, cylinder, and binocular balance, clinicians can optimize visual acuity and ensure patient comfort with prescribed corrections. Mastery of these fundamental steps remains crucial for effective vision care and the delivery of high-quality ophthalmic practice.

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Perioperative Prophylaxis for Endophthalmitis: A Comprehensive Review for General Ophthalmologists

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Introduction

Endophthalmitis represents one of the most devastating complications following ocular surgery, with the potential for severe visual impairment or complete vision loss. Despite advances in surgical techniques and sterile protocols, this sight-threatening condition continues to pose significant challenges for ophthalmologists worldwide. The rarity of endophthalmitis, combined with the multitude of variables involved in ocular surgery, makes prophylactic strategies difficult to study comprehensively. This review synthesizes the best available evidence from current literature to provide practical, evidence-based recommendations for comprehensive general ophthalmologists.[1]

Sources and Pathogenesis of Infection

Multiple potential sources of bacterial contamination must be considered in the prevention of endophthalmitis. These include the tear film, eyelids, and adnexa of the eye; irrigating solutions and medications; surgical instruments; the respiratory and skin flora of surgical personnel; and operating room conditions. While sterile surgical techniques can address many of these sources, infections are primarily believed to arise from the patient's own ocular surface flora, particularly from the tear film, eyelids, and adnexa.[1]

Cataract and Anterior Segment Surgery

Preoperative Prophylaxis

Povidone-Iodine Application

Povidone-iodine (PVI) remains the cornerstone of endophthalmitis prevention. This broad-spectrum antimicrobial and bactericidal agent works by releasing free iodine to target cell surfaces, demonstrating efficacy against drug-resistant bacteria.[2] The European Society of Cataract and Refractive Surgeons (ESCRS) study, a pivotal guideline for endophthalmitis prevention, recommends applying **5% PVI to the cornea, conjunctiva, and periocular skin for at least 3 minutes before surgery.** This protocol can reduce ocular surface flora by up to 90%.[3,4]

Recent investigations have explored lower PVI concentrations (0.25–3.5%), with theoretical advantages including reduced corneal toxicity and greater availability of free iodine for enhanced bactericidal action.[2] However, conflicting results exist, and no established guidelines currently support these dilute concentrations. For patients with PVI allergies, **aqueous chlorhexidine 0.05%** serves as an acceptable alternative.[5]

Preoperative Topical Antibiotics

Major international guidelines consistently discourage routine preoperative topical antibiotics.[2] The ESCRS guidelines have not established clear benefits of preoperative fluoroquinolones when used alongside PVI, and may actually increase bacterial resistance. Both the United Kingdom Royal College of Ophthalmologists (RCOphth)[5] and the American Academy of Ophthalmology (AAO) specifically recommend against preoperative topical prophylactic antibiotics.[6]

Intraoperative Prophylaxis

Intracameral Antibiotics

The landmark ESCRS study demonstrated that **intracameral cefuroxime (1mg/0.1mL) injection at surgery completion reduced endophthalmitis risk by fivefold** (0.049% presumed, 0.025% proven).[3]The Endophthalmitis Study Report from rural India corroborated these findings, showing a 3.6-fold reduction in post-cataract surgery endophthalmitis, with no significant difference between intracameral cefuroxime and moxifloxacin (66.67% and 74.7% reduction, respectively).[7]

Due to limited intracameral options, Indian practice preferences include **moxifloxacin (15-100 mcg/0.1mL) and vancomycin (100-500 mcg/0.1ml)**.[8] Comparative meta-analyses have shown the lowest post-endophthalmitis rates with vancomycin, though concerning reports of associated hemorrhagic occlusive retinal vasculitis have emerged.[9] **Moxifloxacin demonstrates the second-lowest endophthalmitis rates with a superior safety profile**.[8]

Postoperative Prophylaxis

ESCRS guidelines suggest postoperative antisepsis at the surgeon's discretion, considering factors such as surgical environment, complications, and procedure-related risks. The Endophthalmitis Study Report 2, a

prospective comparative Indian study, found no statistically significant difference in endophthalmitis occurrence between patients with or without postoperative antibiotic prophylaxis (fluoroquinolones applied four times daily for one week) after receiving intracameral antibiotics intraoperatively. [10]

A 2017 All-India Ophthalmological Society survey revealed that while Indian practice closely aligned with international guidelines, only 83.8% routinely used PVI, and approximately 40% employed intracameral antibiotics. This highlights a gap between evidence-based guidelines and clinical practice.[11].

Posterior Segment Procedures

Intravitreal Injections

Intravitreal injections have become the most frequently performed procedure in ophthalmology due to their efficacy in treating various retinal conditions.[12] However, the prophylactic use of topical antibiotics has evolved significantly based on emerging evidence.[13/14/15]

Current Evidence Against Routine Antibiotics

Initial protocols included topical antibiotics before and after intravitreal injections to reduce endophthalmitis risk. However, **repeated antibiotic use increases antibiotic resistance of ocular surface flora, potentially increasing infection risk**. The Post-Injection Endophthalmitis in the Comparison of AMD Treatments Trials (CATT) demonstrated that endophthalmitis rates remained low and similar to other large-scale studies, with **perioperative topical antibiotics showing no apparent benefit in reducing endophthalmitis risk**.[16]

Recent American Academy of Ophthalmology guidelines and systematic reviews support these findings, emphasizing that **strict aseptic technique remains the only evidence-based prophylaxis**. [17/18/19/20]

Even theoretical synergistic effects between topical PVI and antibiotics have not demonstrated additional benefits in randomized controlled trials.[21]

AIOS Task Force and VRSI Guidelines

The All India Ophthalmological Society Task Force, considering the Indian healthcare scenario, has established specific guidelines for intravitreal injection prophylaxis:[22/23]

- Apply 5% povidone-iodine to the conjunctival sac for 3 minutes or until dry
- Preoperative antibiotics are preferable but not mandatory
- Subconjunctival antibiotics are unnecessary
- Topical broad-spectrum antibiotic drops may be instilled

Intracameral antibiotic use is at surgeon's discretion: moxifloxacin (100-500 micrograms/0.1 ml) or cefuroxime (1 milligram/0.1 ml) preferred if used

Postoperative topical antibiotics for 7-10 days are optional

Antimicrobial Stewardship Considerations

Antimicrobial stewardship and judicious antibiotic use minimize resistance development. Preoperative antibiotics are unnecessary for routine uncomplicated procedures but may be considered in high-risk patients, including those who are monocular, immunocompromised, have poor tear film, or are prone to infections.[24/25/26/27/28/29]

From a **medico-legal standpoint**, adhering to community norms may be safer, even when not representing optimal practice, as no unanimous strategy exists for preventing post-injection endophthalmitis. Decision-making regarding antibiotic use requires case-specific risk-benefit evaluation.[29]

Vitrectomy Surgery

Post-vitrectomy endophthalmitis (PVE) incidence ranges from 0.02 to 0.84%.[30] Historical use of routine subconjunctival antibiotics in the 1970s has been challenged by evidence showing no statistical difference in endophthalmitis rates between patients receiving subconjunctival antibiotics (0.078%) versus those who did not (0.10%) in a study of 18,886 patients.[1/2]

Evidence-Based Recommendations

A Microsurgical Task Force developed evidence-based recommendations:[31]

- **5% PVI application to conjunctival sac**
- Proper draping with lashes excluded from surgical field
- Conjunctival displacement during port creation
- Angled scleral incisions
- Minimizing vitreous incarceration
- Thorough wound inspection with appropriate suture placement
- Tamponade to prevent hypotony
- Postoperative antibiotics at discretion while avoiding retinotoxic agents

A retrospective study by Bhende et al. compared endophthalmitis incidence before and after introducing preoperative povidone-iodine, finding **no significant difference in incidence rates** despite protocol modifications. [32] Similarly, a multicentric VRSI study group analysis revealed **no significant differences in endophthalmitis rates regardless of**

prophylaxis type used at surgery conclusion.[30]

Key Evidence-Based Recommendations

Procedure	Preoperative	Intraoperative	Postoperative
Cataract Surgery	5% PVI= 3 min; avoid routine antibiotics	Intracameral cefuroxime/ moxifloxacin/ vancomycin	Surgeon discretion based on risk factors
Intravitreal Injection	5% PVI= 3 min; antibiotics optional	Strict asepsis; intracameral antibiotics discretionary	Topical antibiotics optional 7 10 days
Vitrectomy	5% PVI application; proper preparation	Focus on surgical technique and asepsis	Antibiotics at discretion; avoid retinotoxic agents

Conclusion

The most universally beneficial prophylactic measure remains the application of 5% povidone-iodine to the cornea, conjunctiva, and periocular skin for at least 3 minutes before surgery. Intracameral antibiotics, particularly cefuroxime and moxifloxacin, provide significant additional protection for anterior segment procedures. Current evidence increasingly supports antimicrobial stewardship principles, discouraging routine topical antibiotic prophylaxis in favor of targeted, evidence-based interventions.

Postoperative antibiotic prophylaxis should remain at the surgeon's discretion, considering individual patient factors, surgical complexity, and environmental conditions. For intravitreal injections, prophylaxis selection requires careful consideration of risk-benefit ratios, emphasizing aseptic technique over routine antibiotic administration.

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To Study the Prevalence of Refractive Error in School Going Children in Sub-urban areas of Davanagere: A Cross-Sectional Study.

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Abstract

PURPOSE: Uncorrected refractive error is one of the most important causes of visual impairment worldwide. Addressing childhood vision impairment (VI) is one of the main goals of the World Health Organization (WHO) to combat blindness strategies. We aim to report the prevalence of refractive error among the school students in sub-urban areas of Davanagere, India.

STUDY DESIGN: A cross-sectional study was carried out among 2,584 school children under school health program of national program for control of blindness.
METHODS: The study was conducted in 31 schools which included government middle schools, high schools and private aided schools. All children screened underwent a comprehensive eye examination at the school itself. Free spectacles were provided to the students with refractive error.

RESULTS: A total of 2584 school children from classes sixth to tenth aged 9–16 years participated in the study. Among 2584 students examined, 10.02% were suffering from refractive errors, myopia being the commonest 6.5%, astigmatism 2.7% and 0.8% students were hyperopic. The prevalence of anisometropia among students was 5 percent. Age distribution of refractive errors showed myopia to be more prevalent in the age group 13–14 years (29, 37 cases), hypermetropia was more prevalent in the age group 13–14 years (4, 5 cases), and astigmatism was more prevalent in the age group 12–13 years (10, 11 cases).

CONCLUSIONS: The study provides a useful and baseline data about the prevalence of refractive error (10.02%) amongst the school children in sub-urban areas of Davangere. A program with screening and intervention aiming at populations that can't afford basic needs like spectacles is a must in all parts of the country.

Keywords

Refractive Error, Prevalence, Hypermetropia, Myopia, Astigmatism, School Children

Introduction

The aim of this study was to determine the prevalence and distribution of refractive errors in school children. Refractive error is one of the most common causes of visual impairment around the world and second leading cause of treatable blindness [1]. Vision plays an important role in a child's development for learning and communication. Uncorrected refractive error has become a major challenge to healthcare policy makers [2]. While many screening programs in schools are being carried out, there is a lack of accurate data in the prevalence of visual impairment [3]. Active screening and timely intervention at the right time will not only help in vision restoration but will also influence a child's growth and development[2]. Modern technology is changing the lifestyle; hence, children are spending a lot of time in front of television (TV) or computers[4]. This leads to problems in their vision. If the problems are unnoticed, they will suffer in the future from VI and they may even lose their vision completely[4].

Materials and Methods

Source of data: A cross-sectional study was conducted among the school children of sub-urban areas of Davangere. The study was conducted in 31 schools which included government middle schools, high schools and private aided schools.
Inclusion criteria: The study population comprised children aged 9–16 years, primarily middle school and high school students. Evaluating primary school children is challenging, so we have considered only middle and high schools.
Exclusion criteria: Participants younger than 9 years or greater than 16years. Participants with corneal opacities, retinal pathologies, congenital eye disease and systemic disease were excluded from the study.
Statistical analysis: The data were entered in an Excel sheet and analyzed using the Statistical Package for the Social Sciences version 23. The data were expressed as proportions (n, %).
The study was done under the School Health Program of the National Program for Control of Blindness (NPCB) for identification and treatment of refractive errors. A total of 2584 children were screened for refractive errors. Informed Consent was taken from the principals of the selected schools. An eye team consisting of a senior optometrist and ophthalmologist visited the selected schools. The teachers were

sensitized about the magnitude of childhood blindness, their role in the early detection of vision problems, and other eye diseases. An eye health awareness education program was conducted for students and teachers with the help of power point presentation and also short lectures were taken at every school regarding the eye health and visual hygiene. First, we tested the visual acuity of children using a Snellen chart placed at 6 meters. Tropicamide (0.8%) + Phenylephrine (5.0%) eye drops were administered to all age groups for cycloplegic refraction. Homatropine (2%) and Cyclopentolate (1%) eye drops were administered selectively, based on clinical indication. Refractive error was diagnosed when the presenting visual acuity was less than 20/40 or 6/12 and improved to >20/40 or >6/12 with correction. Myopia was defined as measured objective refraction of ≥ (-0.5D) spherical equivalent in one or both eyes. Hyperopia was considered when the measured objective refraction of ≥ (+2.0D) spherical equivalent in one or both eyes was present. Astigmatism was considered when the measured objective refraction of ≥ (±0.75 D) cylinder was there in one or both eyes. These refractive errors were categorized according to the Refractive Error Study in Children (RESC) Survey group. Anisometropia was defined by a difference of ≥ (1 D) spherical equivalent. Spectacles were provided free of cost to children with refractive errors. Children whose vision didn't improve were then referred to the base hospital for a comprehensive ophthalmic examination by an ophthalmologist.

Results

From a total of 2584 students from classes sixth to tenth aged 9–16 years studying in different schools of sub-urban areas of Davanagere, the prevalence of refractive errors was 10.02% (n = 259) among which myopia was the most common with 65% (n = 169), followed by 27% of astigmatism (n = 69), and the remaining 8% (n = 21) with hyperopia [Table 1,3]. Anisometropia was seen in 5% (n = 13) students [Table 1]. Regarding gender, out of 1195 males, 9.51% (114) had refractive errors whereas 10.4% (145) females had refractive errors from a total of 1389 [Table 2]. Uncorrected visual acuity depicted 2325 students had normal visual acuity, 210 students had visual acuity in the range of 6/12–6/24, and the remaining 49 students had visual acuity of 6/36– 6/60 [Table 4]. Age distribution of refractive errors showed myopia to be more prevalent in the age group 13–14 years, hypermetropia in the age group 13–14 years, and astigmatism in the age group 12–13 years [Table 5].

Table 1. Prevalence and distribution of refractive error types in school children.

Number of students	Myopia (%)	Hyperopia (%)	Astigmatism (%)	Anisomteropia (%)
259	169 (65%)	21 (8%)	69 (27%)	13 (5%)

Table 2. Gender distribution of refractive errors among the school children

Gender	No. of students examined (%)	Refractive error (%)	Refractive error (%)
Male	1195	114	09.51
Female	1389	145	10.4
Total	2584	259	10.02

Table.3 Type of refractive error in relation to the sex among the school children

Sex	Myopia (%)	Hyperopia (%)	Astigmatism (%)
Male	76	11	27
Female	93	10	42
Total	169	21	69

Table.4 Uncorrected visual acuity of right and left eyes

VISUAL ACUITY	RIGHT EYE	LEFT EYE
6/6	2067	2053
6/9	258	272
6/12	85	79
6/18	71	70
6/24	54	61
6/36	30	28
6/60	19	21

Table.5 Type of refractive error in relation to the age among school children

AGE	MYOPIA	HYPERMETROPIA	ASTIGMATISM
9	10	1	6
10	13	2	8
11	14	2	9
12	18	2	10
13	29	4	11
14	37	5	8
15	24	3	9
16	24	2	8

Discussion

Screening programs in schools are primarily aimed at detecting refractive errors but the health services provided are inadequate due to the shortage of resources and insufficient infrastructure[2].

Maximum number of students were between age group of 13-15 years and very few below age of 10years.

The students with refractive error increased with the increase in age which is comparable with many studies indicating that with increasing age, the disease increases [1-6].

Myopia was the most common refractive error followed by astigmatism, and hyperopia being the least and many studies have reported similar results[1-6].

The prevalence of myopia was high among all refractive errors and the reason for this might be an increase in screen time among students, the use of which has increased more during COVID-19 due to online classes[4].

Girls were mostly affected with (10.4%) refractive errors as compared to boys (9.5%) and many have reported similar studies. Anisometropia (5%) was equally distributed among girls and boys.

Out of 2584 students screened, 259 (10.02%) were the students with refractive error. The overall prevalence of refractive error was slightly higher compared to study reported by Warad.C et al (6.7%) in Davangere Karnataka. However, a few studies have reported a higher prevalence and this could be due to multiple factors like population size, geographical locations, and race leading to various disparities.

Limitations: Cross-sectional study design limits the ability to establish causal relationships. Study population is limited to a specific geographic region, which may not reflect other geographic regions and broader populations. Children younger than 9 years or greater than 16 years were not examined.

Conclusion

The study provides a useful and baseline data about the prevalence of refractive error (10.02%) amongst the school going children in suburban areas of Davanagere. Myopia was the most common refractive error (65%), followed by astigmatism (27%) and hypermetropia (8%). The prevalence of anisometropia among students was 5 percent. Uncorrected refractive error can lead to visual impairment, thus a program with screening at timely intervals and intervention aiming at populations that can't afford such basic needs like spectacles is a must in all parts of the country, and it should be one of the main components of school health programs. For this, school teachers should be trained in identifying common eye problems so that these children can be referred for prompt treatment. To gain a more precise understanding of refractive errors and other eye conditions, a comprehensive district-wide study is necessary in all schools to facilitate the earliest possible detection of vision problems.

Conflicts of Interest

The author(s) declare no conflicts of interest related to this study.

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Management and Outcomes of Orbital Fractures presenting to a Tertiary Care Centre in India

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Abstract

Purpose:

To analyse clinical characteristics, management and outcomes of orbital fractures.

Methods:

A prospective study was carried out on patients with orbital fractures who reported to clinic over a period of one year with follow up of six months. Patients' demographic details, history, ophthalmic examination findings, CT-orbits findings, management and outcomes were analysed.

Results:

A total of 30 patients were included. Male to female ratio was 22:8. Mean age at presentation was 32.17 years. RTA (73.33%) was the leading cause of orbital trauma. Among RTAs, two-wheeler accidents (81.81%) were more common than four-wheeler accidents (9.09%). Among two-wheeler accidents, 83 per cent were self-driven and in remaining 17 per cent, pillion-riders were involved. None of the patients was wearing protective gear, that is, helmet in two-wheeler and seat belt in four-wheeler. Visual acuity remained >6/9 for majority of the cases (68.33%). Out of 35 orbits in 30 patients, most common type of fracture was blow-out fracture (54.28%), followed by other (45.72%), that is, ZMC fractures involving two or more orbital walls. Nearly 83 per cent of the patients had unilateral fracture and the remaining had bilateral fracture. Orbital floor was the most common fracture site (60%). Nearly one-fifth patients underwent surgical intervention. Two-thirds of the cases requiring surgical intervention were associated with ZMC fracture. Out of the patients who underwent surgery, an equal number of patients (16.67%) had post-operative complications, namely, residual diplopia, residual EOM restriction and symblepharon formation.

Conclusion:

Early correction of orbital fractures prevented future morbidities and provided good post-operative outcomes.

Key words:

RTA, Orbital Fracture, Visual Acuity, Diplopia

Key message:

Road traffic accidents are most common cause of orbital trauma. To avoid trauma and other morbidities while travelling, it is critical to wear protective gear, such as helmet on a two-wheeler and seat belt on a four-wheeler. Early repair of orbital fractures prevented future morbidities and provided good post-operative outcomes.

Introduction

Orbital fractures are a consequence of middle third facial trauma and occur as a result of the application of forces that overcome the resistance of bone structures forming the orbital cavity.[1]

The ophthalmic involvement is inevitable in mid-facial fractures as the soft tissues absorb more energy at the time of impact than the underlying bones. A comprehensive understanding of orbital fractures is necessary for the treating physician due to the functional and aesthetic deformities that often result. The incidence of road traffic accidents (RTAs) is on the rise and associated with it are the facial trauma. Studies have estimated that orbital fractures account for roughly 10 to 25 per cent of all cases of facial fractures. The reported incidence of ocular injuries in patients with orbito–zygomatic fractures varies widely ranging from 2.7 per cent to 90 per cent. Orbital injuries are most commonly seen in conjunction with assaults and motor vehicle accidents (MVAs). MVA-related orbital fractures, in particular, tend to be more destructive and are associated with more concomitant organ injuries, zygoma fractures, and multiple orbital wall fractures than the other common causes of assault, sports-related, falls, and so forth.[2]

These fractures are very frequently associated with damage to the surrounding soft tissue and they sometimes damage the orbital cavity contents or communicate the orbit with adjacent structures

(cranial cavity, paranasal sinuses or nasal cavity).[1]
CT scan is currently the gold standard for assessing orbital fractures.[3] Orbital fracture management aims at the early and correct restoration of fracture fragments in order to avoid severe dysfunction of the visual apparatus.[4]
The specific objectives of the study are: (1) to study the pattern of orbital fracture with facial injury following blunt trauma; and (2) to analyse clinical characteristics, management and outcomes of orbital fractures.

Methods

A Prospective study was carried out on patients with orbital fractures who reported to the tertiary care centre over a period of one year (September 2019 – August 2020). The sample size of the study is 35 orbits of 30 patients. Ethical approval for the study was obtained from the institute's ethics committee.
All cases with orbital fractures detected on CT Orbits and those willing to give informed consent for the study were recruited from the department of ophthalmology of a tertiary care centre, both out-patients and in-patients. Post surgical patients who are loss to follow up and who were not willing to give informed consent were excluded from the study.

A detailed history involving demographic data, mode of injury and use of protective measures of all the patients meeting the inclusion criteria during the study period of one year was taken. Following which detailed ocular examination involving Best Corrected Visual Acuity (BCVA), slit lamp examination, Extraocular Movements (EOM), diplopia charting, Intraocular Pressure (IOP), indirect ophthalmoscopy was done and the findings were noted. CT orbit was used as a diagnostic tool. CT orbit of 1 mm cuts, bony windows with coronal, axial and sagittal views along with three-dimensional reconstruction was done.

Depending on the type and severity of orbital fracture, patients were subjected to conservative or surgical mode of treatment. Nearly one-fifth of the patients (20%) underwent surgical intervention. Two-thirds of the cases requiring surgical intervention were associated with ZMC fracture. Surgical time between the trauma and the intervention was one to two weeks allowing the peri-orbital edema to reduce.
Surgical management was done in large fractures more than half the orbital floor with herniation of the orbital contents into the maxillary sinus or muscle entrapment. Other indications for surgery were enophthalmos of greater than 2 mm; persistent, significant diplopia in the primary position.
Open reduction with internal fixation (ORIF) under general anaesthesia was done. Trans-conjunctival approach was used. Large fractures were treated using titanium mesh and smaller fractures using porous polyethylene implant. Out of six patients who underwent surgery, porous polyethylene implant and orbital plates were used in five patients; and combined titanium mesh was used in one patient. When ZMC and other fractures were involved, help of the other teams like maxillofacial surgery, ENT and neurosurgery were taken.

Patients were followed up at 1 week, 1 month, 3 months and 6 months interval to assess the outcomes. All the post operative complications and the outcomes were noted and analysed with descriptive statistics.

Results

There was a wide distribution of patients across various age groups with majority of them between 21-40 years. The mean age at presentation was 32.17 years. Males were more frequently injured compared to females, 73.33 per cent as against 26.67 per cent (Male to Female ratio-22:8).

MVA was the most common cause for injury (73.33%) followed by self-fall (20%) and assault (6.67%). Among MVAs, two-wheeler accidents were more common (81%) than four-wheeler accidents (9%). None of the patients were wearing protective gear, that is, helmet in two-wheeler and seat belt in four-wheeler (Table 1).

Table 1: Type of Vehicle and Victim Category

Type of Victim	Position on the vehicle	No. of patients	Percent
Two-Wheeler (81.81%)	Self drive	15	83.33
	Pillion Rider	3	16.67
Four-Wheeler (9.09%)	Front Seat	2	100.00
	Back Seat	0	-
Pedestrian (9.09%)	-	2	-

Peri-orbital edema (96.67%) and SCH (83.33%) were the most common presentations. Other signs and symptoms included peri-orbital ecchymosis (53.33%), EOM restriction (36.67%), ocular adnexa laceration (36.67%), enophthalmos (30%), RAPD (30%), DOV (16.67%), hypoglobus (10%), diplopia (6.67%), lagophthalmos (3.33%), corneal epithelial defect (3.33%) and 3rd cranial nerve palsy (3.33%) (Table 2).

Table 2: Presenting signs and symptoms in patients with orbital fracture

Signs and Symptoms	No. of Cases	Per cent
Periorbital edema	29	96.67
Sub-conjunctival Haemorrhage (SCH)	25	83.33
Periorbital ecchymosis	16	53.33
Extra-ocular Movement (EOM) Restriction	11	36.67
Ocular adnexa laceration	11	36.67
Enophthalmos	09	30.00
Relative Afferent Pupillary Defect (RAPD)	09	30.00
Diminision of Vision (DOV)	05	16.67
Hypoglobus	03	10.00
Diplopia	02	6.67
Lagophthalmos	01	3.33
Corneal epithelial defect	01	3.33
3rd Cranial nerve palsy	01	3.33

Visual acuity (VA) was maintained in majority of the patients with >6/9 in 68.33 per cent. In 1.67 per cent of the patients VA was PL negative (Figure 1).

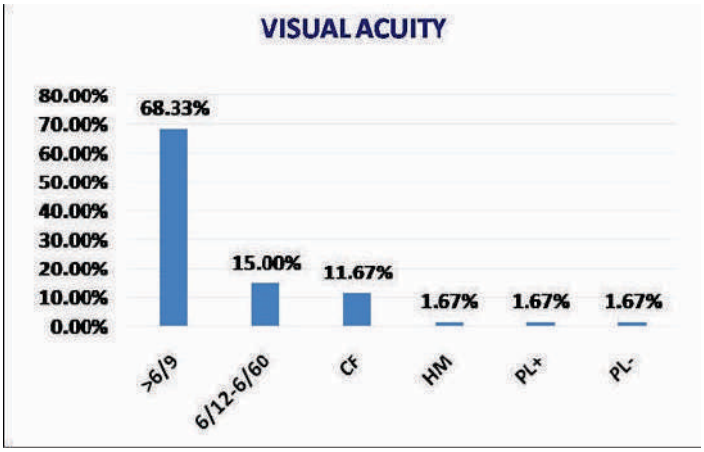

Figure 1: Visual acuity at presentation

The most common type of fracture was blow out fracture (54.28%) followed by other (45.72%), that is, zygomaticomaxillary complex (ZMC) involving two or more orbital walls. Nearly 83 per cent of the patients had unilateral fracture and the remaining had bilateral fracture. Orbital floor (43%) was the most common wall involved followed by medial wall (23%), lateral wall (22%) and orbital roof (12%).

Nearly one-fifth patients (20%) underwent surgical intervention; sixty three per cent of the patients underwent conservative treatment and seventeen per cent refused surgery. Two-thirds of the cases requiring surgical intervention were associated with ZMC fracture.

Post-surgery complications like residual diplopia, residual EOM restriction and symblepharon were noted in equal number of patients (16.67%). Figures 2, 3 and 4 show the pre and post-operative images of the operated cases.

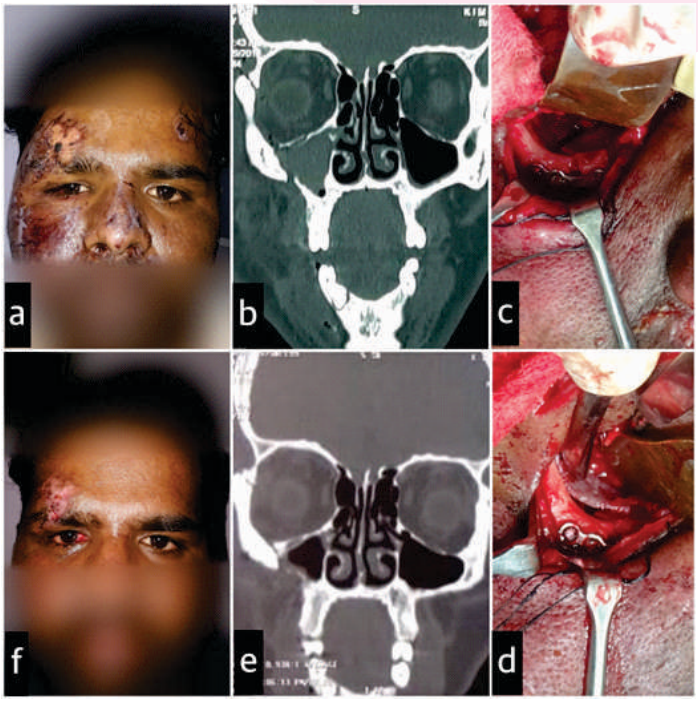

Figure 2: (a) Pre-operative clinical image showing periorbital edema and SCH of the right eye; (b)Pre-operative CT orbits showing orbital floor fracture of the right orbit with ZMC fracture; (c) Intra-operative image showing the extent of the bony defect exposed through a transconjunctival approach; (d) Intra-operative image showing placement of porous polyethylene implant over the bony defect and fixation of an orbital plate along the inferior orbital rim; (e,f) Post-operative clinical image and CT orbits showing

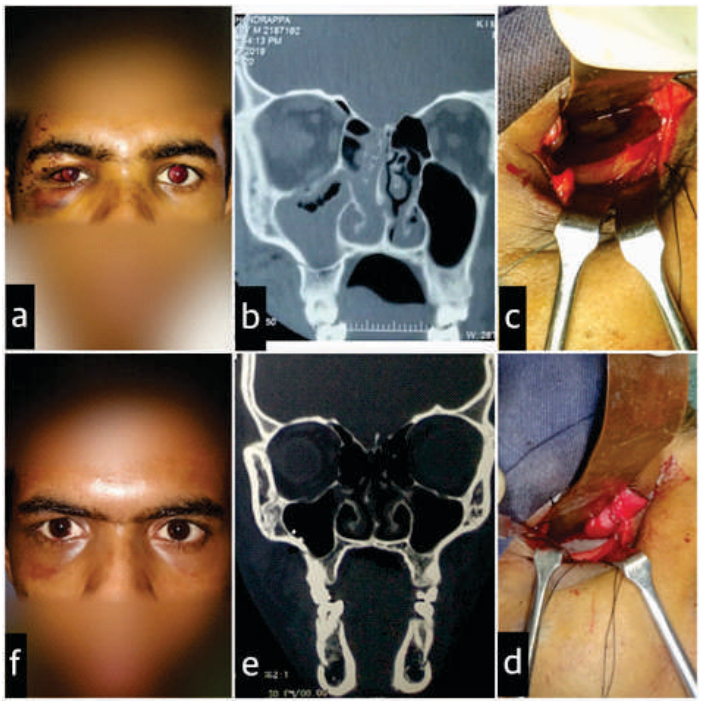

Figure 3: (a) Pre-operative clinical image showing periorbital edema and SCH of the right eye; (b)Pre-operative CT orbits showing floor and undisplaced lateral wall fracture of right orbit with ZMC fracture; (c) Intra-operative image showing the extent of right orbital floor fracture exposed through a

transconjunctival approach with soft tissue retraction; (d) Intra-operative image showing placement of porous polyethylene implant over the fracture site; (e,f) Post-operative clinical image and CT orbits showing satisfactory reconstruction of the right orbital floor.

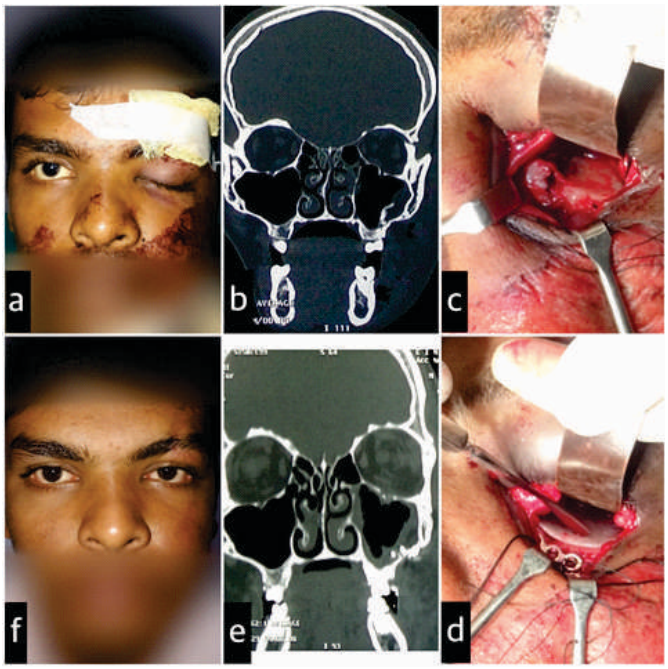

Figure 4: (a) Pre-operative clinical image showing periorbital edema and ecchymosis of the left eye; (b)Pre-operative CT orbits showing a fracture of the left orbital floor with herniation of orbital contents into the maxillary sinus, along with a ZMC fracture; (c) Intra-operative image showing the extent of the bony defect exposed through a transconjunctival approach; (d) Intra-operative image showing placement of porous polyethylene implant over the bony defect and fixation of an orbital plate along the inferior orbital rim; (e,f) Post-operative clinical image and CT orbits showing adequate left orbital floor reconstruction with well-positioned implant.

Discussion

The mean age at presentation was 32.17 years. Males were more frequently injured compared to females. Similar pattern is seen in studies done by Amrith *et al.*[5], Barry *et al*[6] and Jamal *et al.*[7] MVA was the most common cause for injury (73.33 per cent) followed by self-fall and assault. The studies conducted by Kamath *et al.*[8] and Rosado *et al.*[9] showed similar results.

Among RTAs, two-wheeler accidents (81.81 per cent) were more common than four-wheeler accidents (9.09 per cent). None of the patients was wearing protective gear, that is, helmet in two-wheeler and seat belt in four-wheeler. The study done by Nakhgevany *et al.*[10] supports the data that suggests that the use of seat belts prevents a wide range of injuries including facial trauma in MVAs. The involvement of facial bones in RTAs is on the rise, which can be related to a lack of use of helmets or seat belts. CT scan is currently the gold standard for assessing orbital fractures.[3] Most common type of fracture was blow-out fracture (54.28 per cent), followed by other (45.72 per cent), that is, ZMC fractures involving two or more orbital walls. Orbital floor was the most common fracture site followed by medial wall. Our results were consistent with other studies.[11,5]

Nearly one-fifth patients underwent surgical intervention. Two-thirds of the cases requiring surgical intervention were associated with ZMC fracture. Surgical time between the trauma and the intervention was one to two weeks. Trans-conjunctival approach was used as it offers a good exposure to the orbital floor without visible scar. Most surgeons now recommend early operation for better postoperative results and decreased incidences of diplopia and enophthalmos due to less soft tissue scarring.[12,13] The one to two week window represents a happy medium of edema control and scar formation that lowers the risk of residual functional deficits after fracture repair.[14]Surgical management is indicated in large fractures more than half the orbital floor with herniation of the orbital contents into the maxillary sinus or muscle entrapment. Other indications for surgery are enophthalmos of greater than 2 mm; persistent, significant diplopia in the primary position or oculocardiac reflex.[15]

In the current study, large fractures were treated using titanium mesh and smaller fractures using porous polyethylene implant. When ZMC and other fractures were involved, help of the other teams like Maxillofacial surgery, ENT and Neurosurgery were taken. In five out of six patients who underwent surgery, porous polyethylene implants and orbital plates were used, whereas combined titanium mesh was used in one patient.

Alloplastic materials include non-absorbable material such as Silastic, Medpore, Titanium mesh or absorbable polymers. For smaller fractures (<2.5cm^2) and in children, resorbable implants such as PDS sheets are recommended.[16] Titanium mesh is preferred for large orbital floor defects.[17] Autogenous bone should be particularly considered in complex orbital fractures.[18] Porous polyethylene implant has high biocompatibility, can be easily trimmed to any desired shape, can be screw-fixated to bone, and has good strength and long-term stability. The implant can be easily removed if needed. The infection rate is low. It

is costly and not radiopaque.[19]

Titanium mesh is a highly biocompatible metallic substance, with a low rate of extrusion and infection, which has been related to the tendency of titanium to cause an inflammatory and fibrogenic response to the surrounding tissue.[20, 21] It has good osteo-integration and mechanical properties making it a good substitute for bone.[22] Although orbital adherence and extraocular muscle restriction have been reported with titanium implants.[23]It is widely available, although at high cost. Implant-related complications were not observed in our study.

Patients were followed up for a period of six months after surgery. Out of the patients who underwent surgery, an equal number of patients (16.67 per cent) had post-operative complications, namely, residual diplopia, residual EOM restriction and symblepharon formation. The patient with post-surgery symblepharon underwent symblepharon release and lateral canthal repair after one and half month post-surgery.

Transient diplopia after surgery is common and will typically improve or resolve in a few weeks.[24]However, the reported incidence of persistent diplopia ranges from 8 per cent to 42 per cent.[25, 26] This degree of occurrence strongly reinforces the need for intraoperative forced duction testing, as implant impingement can certainly be a cause for persistent diplopia.[27]Despite advancements in surgical technique and the advent of newer alloplastic materials, clinically significant diplopia and extra-ocular movement restriction are not uncommon complications following orbital fracture repair. Diplopia after orbital fracture repair can be caused by a number of factors, including direct damage to the muscles or nerves, persistent entrapment of orbital tissue within the fracture site, and cicatrization of tissue surrounding the implant used for repair. Previously reported pre-operative risk factors for post-operative diplopia included combined orbital floor and medial wall fractures,[25] fractures involving more than half the orbital floor[28] and patients having CT evidence of entrapped muscles.[29]
Surgical outcomes with respect to ocular motility restrictions, diplopia and enophthalmos showed a significant improvement at the final follow up.

To conclude, the RTAs were the most common cause of orbital trauma. To avoid trauma and other morbidities while travelling, it is critical to wear protective gear, such as a helmet on a two-wheeler and a seat belt on a four-wheeler. The vast majority of patients required conservative treatment, with only a handful requiring surgical intervention. Surgical outcomes with respect to ocular motility restrictions, diplopia and enophthalmos showed a significant improvement at the final follow up. Early repair of orbital fractures prevented future morbidities and provided good post-operative outcomes.

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A Novel Technique-Hydro-free Mechanical Delamination in Phacoemulsification for Posterior Polar Cataract – Our Experience

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Abstract

Aim: To describe a novel technique of hydro-free mechanical delamination while doing phacoemulsification in posterior polar cataract cases.

Methods: Eighty two eyes with posterior polar cataracts underwent complete anterior and posterior segment evaluation. Hydro-free mechanical delamination technique was done using intra-ocular lens (IOL) dialer/Sinskey hook or bent cystotome to separate endonucleus from epinucleus followed by safe phacoemulsification.

Results: Out of the total, 76 eyes had a soft nucleus, while six eyes presented with a moderately hard nucleus. Anterior segment optical coherence tomography (AS-OCT) revealed pre-existing posterior capsular dehiscence in three eyes (3.7%). Among these, two eyes (2.4%) exhibited posterior capsular extension accompanied by vitreous loss, which was managed through automated anterior vitrectomy and the placement of a posterior chamber IOL. One of these eyes developed cystoid macular edema which was managed conservatively. In all cases, the IOL was implanted in the capsular bag, except for one case where the IOL was placed in the sulcus with the haptics positioned 90 degrees away from the site of posterior capsular rupture.

Conclusion: The technique of hydro-free mechanical delamination is very helpful in posterior polar cataract cases as it is safer in creating a mechanical cushion around the nucleus and epinucleus and facilitates a safer phacoemulsification.

Keywords:
Posterior polarcataract;phacoemulsification; hydrodissection; posterior capsule rupture; capsular dehiscence

Introduction

A posterior polar cataract is a discoid, plaque-like cataract located posteriorly, marked by the build-up of extracellular material. It is thought to arise from abnormal lens fibres that undergo degenerative changes as they migrate from the lens equator towards the posterior region.

The advancements in strategies for managing posterior polar cataracts (PPC) have been directed towards enhancing surgical safety and reducing intraoperative complications. These refined approaches aim to minimize risks such as PCR and nucleus drop, thereby improving overall outcomes.

The authors introduce an innovative technique for hydro-free mechanical delamination utilizing an Intra-ocular lens (IOL) dialer/Sinskey hook or bent cystotome in phacoemulsification. This method creates a partial-thickness groove around the endonucleus and epinucleus that facilitates nuclear management by providing an epinuclear and cortical cushion, thereby enabling safer phacoemulsification in posterior polar cataracts.

Methods

The study was conducted in accordance with the Declaration of Helsinki and received approval from the ethics committee. Written informed consent was obtained from all participants. The study focused on patients experiencing visual impairment due to posterior polar cataract. Preoperative assessments included refraction and a comprehensive slit lamp examination to evaluate the size of the PPC, nuclear sclerosis grading, and any pre-existing posterior capsule (PC) dehiscence. Additionally, Goldmann applanation tonometry, fundus examination, and anterior segment optical coherence tomography (AS OCT) were performed to assess the status of the posterior capsule (Figure 1 and 2). Biometry was carried out using the IOL Master 700 (Zeiss, Germany), and IOL power calculation was performed using the Barrett Universal II formula. Prior to surgery, patients were informed about the nature of their cataract, the potential for compromised capsule support in cases of PC dehiscence, the possibility of requiring additional surgical interventions, and alternative IOL options.

Figure 1: (a) Slit-lamp image of PPC. (b) AS OCT image of the same eye showing intact posterior capsule.

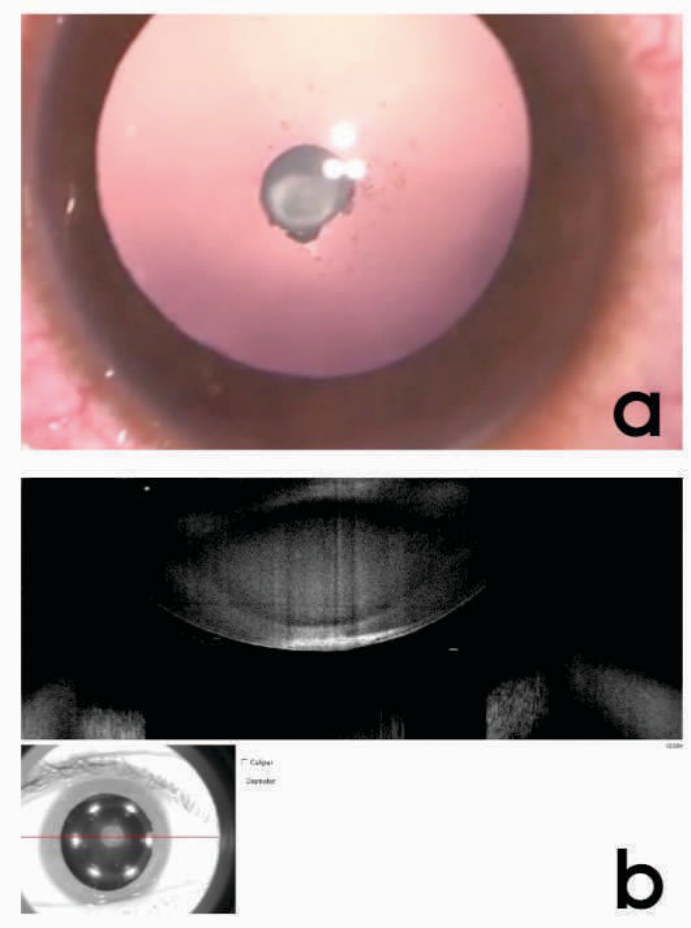
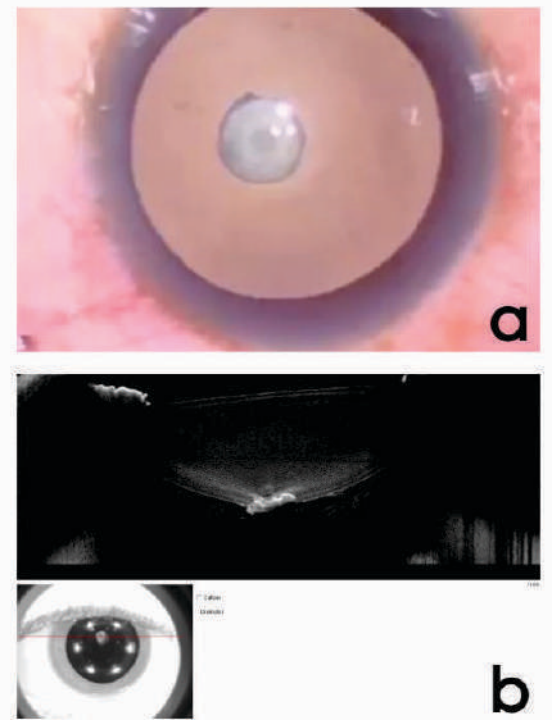


Figure 2: (a) Slit-lamp image of PPC (b) AS OCT image of the same eye showing posterior capsular dehiscence.



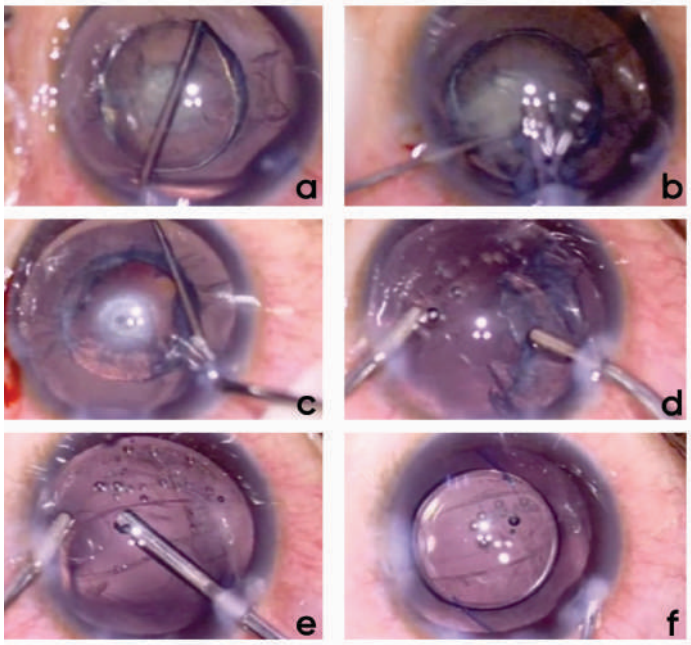
Surgical Technique

Pre-operative mydriasis is achieved by Tropicamide 1.0% and Phenylephrine 2.5% eyedrops. Surgery is performed under peribulbar anaesthesia using 2.0 % Lidocaine hydrochloride (Xylocaine). Two side ports are made 45 degrees from the planned clear corneal incision. Anterior capsule is stained with 0.06% Trypan blue dye (Auroblue, Aurolabs. India). Cohesive viscoelastic substance (Appavisc, Appasamy associates, India) is injected to form the anterior chamber and temporal clear corneal incision is made with 2.4mm keratome. Continuous curvilinear capsulorrhexis of 5-5.5mm is made using bent 26 G needle cystotome. Mehanical delamination is done using a Sinskey hook/IOL dialer or a bent cystotome by introducing the tip of the instrument into the substance of the nucleus slightly beyond the capsulorrhexis margin. The endonucleus is mechanically separated all around to ensure partial separation from the epinucleus. The endonucleus is chopped and laterally separated using low flow and vacuum techniques where feasible, followed by emulsification. To prevent anterior chamber collapse and iris-lens diaphragm bulging, viscoelastic substance is injected into the anterior chamber before withdrawing the phaco probe. The epinucleus is mechanically separated from the cortex using Sinskey hook or IOL dialer and removed by phaco emulsification or phaco aspiration or with irrigation and aspiration depending on the density of epinucleus. A thorough 360° cortical clean-up is performed, and the IOL is implanted within the capsular bag. The viscoelastic is fully removed, and the side ports are gently hydrated, avoiding vigorous irrigation (Figure 3 and 4).

Figure 3: Intra-operative images (a) Hydro free mechanical delamination of endonucleus using Sinskey hook (b) Phacoemulsification of the endonucleus using low power settings (c,d) Mechanical separation of epinucleus (e) Phacoaspiration of the epinucleus (f) Placement of PCIOL in capsular bag.

Figure 4: Intra-operative images of the same eye as figure 2 (a) Hydro free mechanical delamination of endonucleus using Sinskey hook (b) Phacoemulsification of the endonucleus using low power settings (c) Mechanical separation of the

epinucleus using Sinskey hook (d) Phacoaspiration of the epinucleus (e) Extension of pre-existing posterior capsular rent noted and automated anterior vitrectomy being done. (f) Three piece IOL placed in sulcus with optic capture and haptics perpendicular to the posterior capsular tear.



Results

The study included 82 eyes of 67 patients (52 unilateral/ 15 bilateral) with PPC who underwent phacoemulsification between January 2021 to December 2023. The mean age of patients was 43.4 years. Patient demographics are given in table 1. Average follow-up period was 13 ± 1 months (range 6-36 months). Mechanical delamination could be done successfully in all cases. Nucleus was soft in 76 eyes and moderately hard in 6 eyes (Lens Opacities Classification System III). AS OCT was done in 60 eyes where 57 eyes were noted to have intact PC whereas three eyes had a pre-existing PC dehiscence (3.7%). Two cases of pre-existing PC dehiscence had vitreous loss and were managed through automated anterior vitrectomy (2.4%).In one case, the IOL was placed in the capsular bag, while in the other, the IOL was positioned in the sulcus with optic capture (1.2%). Out of the two, one eye developed post-operative cystoid macular edema (CME) (1.2%) which resolved with medications and the other eye had no post-operative complication. In one eye with PC dehiscence, no extension of the defect was noted and IOL was placed in capsular bag. In all the cases, a single piece IOL was placed in the bag (in case with preexistent PCR the haptics were placed away from the area of PCR) except in one case where IOL haptics were placed in the sulcus with optic capture.

Table 1: Patient demographics

Number of patients	67
Male:Female	32:35
Age (years)	27-61
Number of eyes	82
Unilateral: Bilateral	52:15
Type of nucleus (Lens Opacities Classification System III/ LOCS III)	Soft nucleus: 76 Moderately Hard nucleus: 6
Pre-existent PC Dehiscence	3

Table 2: Comparison between the PCR rates between our study and other studies

Studies	Surgical technique	Number of eyes	PCR (%)
Our study	Hydro free mechanical delamination in phacoemulsification	82	2.4
Vasavada A et al[2]	Hydrodelineation in phacoemulsification. No hydrodissection or nucleus rotation was attempted	25	36
Osher R H et al[3]	Hydrodissection in Phacoemulsification	31	26
Vasavada A R et al[4]	Femtodelineation in phacoemulsification	45	4
Salahuddin et al[9]	Inverse horse-shoe in phacoemulsification	28	7.1
Lee et al[7]	Controlled hydrodelineation in Phacoemulsification	36	11.1
Ravindra et al[8]	Minimal hydrodissectiona and nucleus rotation with proper fluidics in Manual small incision cataract surgery	24	0
Siatiri et al[14]	Gentle hydrodelineation (Hydro-free Phacoemulsification)	38	0

Discussion

PPC is a prevalent form of congenital cataract that leads to disturbances in vision. It features a dense white opacity on the central posterior capsule, characterized by a distinctive circular plaque with concentric whorls.[1] Cataract surgeons have long been

concerned about PPC because of their tendency to cause posterior capsule rupture. While complications can be minimized, no surgical technique can fully eliminate the risk of posterior capsular rupture. Traditionally, cortical cleaving hydrodissection was considered risky for PPC because the hydraulic pressure involved could lead to PCR. It is hypothesized that a high rate of PCR might result from either a thin posterior capsule, which can rupture with minimal trauma, or a plaque that adheres closely to an otherwise normal capsule.[2] The frequency of PCR occurring with PPC varies widely, with older studies showing rates as high as 36%[2] and 26%[3], while more recent research indicates rates as low as 4%[4]. Minimal hydrodissection and hydrodilineation in posterior polar cataract extraction was described by Fine et al[5] where hydrodissection in multiple quadrants is done to minimise over pressurising the anterior chamber or capsular bag thereby preventing risk of PCR. Allen and Wood[6] utilized viscodissection to separate only the peripheral cortex from the capsule, while Lee[7] completely avoided the use of hydrodissection. Nuclear rotation was considered contraindicated, as the edges of the opacity could function like a trephine, potentially leading to a posterior capsular tear. Ravindra et al described a low-flow manual small-incision cataract surgery technique that involves minimal hydrodissection and limited nucleus rotation, resulting in no posterior capsule rent. They emphasize the use of controlled hydrodissection and careful nuclear rotation to enhance the safety of the procedure.[8]

Salahuddin et al. in his study used the inverse horseshoe technique for phacoemulsification in PPC cases, performing controlled hydrodelineation followed by viscodelineation and viscodissection. The reported incidence of posterior capsule rupture (PCR) using this approach was 7.1%.[9] Patwardhan et al. introduced a novel technique of sidewayssculpting during phacoemulsification, which lessens undue stress on the posterior capsule, thereby reducing the incidence PCR.

Chee has described a technique for management of PPC in dense nucleus where a central trench is formed, followed by the division of the nucleus. The heminuclei are then horizontally chopped into smaller fragments. This technique reduces the risk of nuclear fragments dislocating into the vitreous cavity. Other nucleotomy techniques have been described like V technique, lambda technique, inverted horseshoe technique or trident technique which could be used for safe nuclear emulsification without rotation.

Table 2 enlists the incidence of PCR in various studies and its comparison with our study.

In our study, we successfully achieved mechanical delamination in all cases, with most cataracts having a soft nucleus. Of the three cases with pre-existing PC dehiscence, two experienced intraoperative extension of the defect, while one case remained stable without any further extension. The primary advantage of this technique is its ease of execution and reproducibility. However, its limitation arises in cases of dense brunescent cataracts, where mechanical delamination of the endonucleus is challenging, and there's an increased risk of capsular or zonular stress.

Conclusion

This study demonstrates that the hydro-free mechanical delamination technique is both safe and reproducible. It effectively minimizes intraoperative complications and yields favourable postoperative outcomes.

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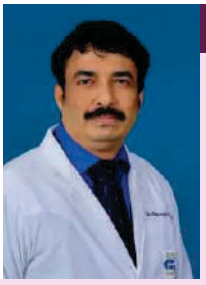

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Comprehensive Management of Subretinal Abscess in the Setting of Endogenous Endophthalmitis

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Subretinal abscess is a rare but vision-threatening manifestation of endogenous endophthalmitis, which arises when pathogens reach the eye via the bloodstream from a distant systemic foci. Early recognition and aggressive management are crucial due to the potential for rapid visual deterioration and systemic complications.

The clinical approach begins with a high index of suspicion in patients presenting with decreased vision, ocular pain, and redness-particularly in those with risk factors such as immunosuppression, intravenous drug use, indwelling catheters, or systemic infections like infective endocarditis or liver abscess.[1,2] Fundoscopic examination may reveal a yellow-white subretinal lesion, often with overlying haemorrhage or vitritis. In cases where media opacities limit visualization, B-scan ultrasonography may be useful in identifying subretinal masses and associated retinal detachment.

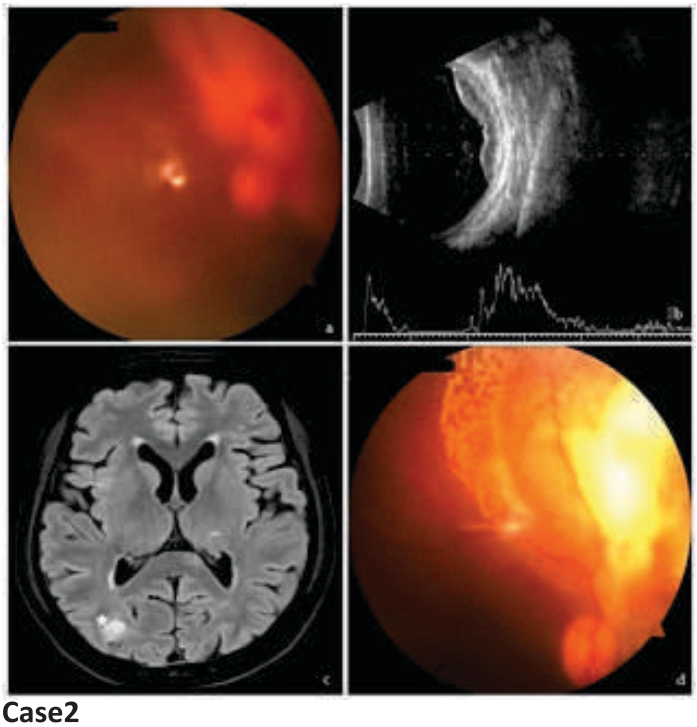
Diagnostic workup involves both ocular and systemic investigations. Aqueous or vitreous samples should be obtained for Gram stain, culture, and Polymerase Chain Reaction (PCR) to identify causative organisms. Blood cultures and systemic imaging are essential to locate the primary source of infection, even though the culture positivity in endogenous endophthalmitis is found to be about 58.6%.[3]

Treatment is primarily medical and should begin empirically based on clinical suspicion without waiting for culture results. This includes intravitreal and systemic broad-spectrum anti microbials. Therapy should be adjusted based on microbiological results.

Surgical intervention with pars plana vitrectomy is often required in cases of large abscesses, significant vitritis, or lack of response to medical therapy. In select cases, direct drainage of the subretinal abscess may be performed during surgery.[4]

Case 1

A 45-year-old male with generalized myasthenia gravis ,post-thymectomy and recently treated with intravenous rituximab, presented with a 4-day history of pain, redness, and decreased vision in the right eye (RE). He was on empirical IV vancomycin and piperacillin-tazobactam for multiple skin abscesses, including scalp and forearm lesions. RE vision was counting fingers at 1m with a large subretinal abscess superonasally. (fig a and b) The patient underwent anterior chamber (AC) tap, intravitreal (IVI) vancomycin(1 mg/0.1 ml) and ceftazidime (2.25 mg/0.1 ml) was initiated. AC tap came negative for any growth. The following day, he developed left-sided weakness; MRI showed a brain abscess.(Fig c) Cultures from blood, and scalp pus grew Nocardia farcinia, sensitive to amikacin and meropenem. With progression of ocular findings, he underwent vitreous biopsy with pars plana vitrectomy with silicone oil tamponade and IVI antibiotics. Vitreous biopsy also grew Nocardia. Systemic antibiotics were switched to imipenem and linezolid. The patient received a total of 7 doses of IVI ceftazidime and IVI meropenem every 48 hours, and 2 doses of IVI amikacin weekly. The antibiotic doses were adjusted downward to account for the silicon oil bubble in the vitreous. At 1-month follow-up, RE vision improved to 6/36 with complete resolution of the subretinal abscess.(fig d)



Case2

A 34-year-old woman with a recent acute exacerbation of bronchial asthma, treated with systemic corticosteroids and antibiotics, presented with sudden drop in vision in the RE. Fundus examination revealed a

large subretinal abscess involving the macula. (a) Investigations showed positive sputum culture for *Aspergillus flavus* and an elevated serum galactomannan (2.5). An anterior chamber tap was performed, and the patient was started on empirical intravitreal voriconazole and meropenem. Although the aqueous sample was negative for fungal elements, both intravitreal and systemic antifungals were continued. Due to progressive worsening after two intravitreal injections,(b) the patient underwent vitreous biopsy, pars plana vitrectomy, silicone oil injection, and repeat intravitreal antimicrobials. Vitreous cultures remained negative. With continued poor response, a repeat surgery was performed, including subretinal abscess drainage via the superior margin using a 25G cutter.(c) The subretinal aspirate tested positive for *Aspergillus* on culture and PCR analysis. Intravitreal voriconazole was continued, and the lesion showed scarring and resolution over two weeks.(d)

In conclusion, the management of subretinal abscess in endogenous endophthalmitis requires a multidisciplinary, individualised and timely approach. Prompt diagnosis, targeted antimicrobial therapy, and surgical intervention when indicated are essential to preserve vision.

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Refractive Reboot: Overcoming Surgical Complications

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Abstract

Presenting a case of 24 year old female who underwent right eye phakic IOL surgery elsewhere and presented to our OPD one year later with reduced vision post surgery. Patient had right eye decompensated cornea with synechial angle closure post complicated phakic IOL surgery. After undergoing Descemet stripping endothelial keratoplasty, phakic IOL explantation and phacoemusification and IOL implantation, patient regained vision and is doing well.

Case Report

24 year old female presented to our outpatient department with complaints of blurring of right eye vision since 1 year which was associated with redness, pain and watering in the right eye. Patient gave history of undergoing right eye phakic IOL surgery elsewhere one year back with no improvement in vision following surgery and was associated with redness, watering and two episodes of vomiting on the first post operative day. Patient had been using 0.5% timolol eyedrops, 5% sodium chloride eyedrops, 1% prednisolone acetate eyedrops and 1% brinzolamide eyedrops on and off since 1 year with no improvement in symptoms. On ocular examination, right eye visual acuity was 3/60, not improving and left eye visual acuity was 2/60 improving to 6/6 with -8.50 diopter spherical correction. The intraocular pressure in the right eye was 32 mm of Hg and left eye was 14 mm of Hg. Slit lamp examination of right eye showed epithelial bullae, stromal corneal edema, irregular anterior chamber depth with peripheral anterior synechiae in three quadrants, multiple iris atrophic patches with patent peripheral laser iridotomy noted, phakic IOL and crystalline lens seen hazily. Right eye fundus examination hazily appeared normal. Left eye anterior and posterior segment examination was unremarkable. On investigating, right eye anterior segment OCT showed a high vault of 896 microns [Figure 1], UBM showed peripheral anterior synechiae [Figure 2] and specular microscopy showed low cell density of 926 cells/mm^2 and hexagonality of zero percent. Left eye investigations were normal. Diagnosis of right eye decompensated cornea with synechial angle closure post phakic IOL surgery was made. Intraocular pressure was controlled with 0.5% timolol eyedrops and 1% brinzolamide with 0.2% brimonidine eyedrop combination and surgical management was planned. Patient underwent right eye Descemet stripping endothelial keratoplasty (DSEK) with synechiolysis with phakic IOL explantation and phacoemulsification with foldable Acrysof IOL implantation in the bag as cataractous lens changes were noted intraoperatively. Post operatively, patient was managed with 1% prednisolone acetate eyedrops, 0.5% moxifloxacin eyedrops, 0.5% carboxymethyl cellulose eyedrops, 0.5% timolol eyedrops and 1% brinzolamide with 0.2% brimonidine eyedrop combination. Patient was on regular biweekly follow up post operatively. At 3 months follow up, unaided visual acuity was 6/12 with controlled intraocular pressure of 18 mm of Hg on the same antiglaucoma medications. On examination, clear, well attached DSEK graft, with intraocular lens in the bag was noted [Figure 3].

Discussion

Phakic IOLs are commonly done procedures today for correction of refractive errors. Usually a safe procedure, few studies have documented some complications of the same including raised intraocular pressure due to retained viscoelastics, pupillary block glaucoma, pigment dispersion; anterior subcapsular cataract formation; Urrets-zavalia syndrome; abnormal vault height; corneal decompensation; toxic anterior segment syndrome; endophthalmitis; and retinal complications like macular edema, retinal detachment.[1]

In our patient, the most likely cause of complicated phakic IOL surgery appears to be toxic anterior segment syndrome (TASS) as the patient gives a history of redness, pain and vomiting on first postoperative day. TASS if not properly managed, can lead to recurrent trabeculitis leading to PAS formation, as well as long standing inflammation leading to corneal endothelial damage and cataract formation.

TASS is a rare, acute sterile post operative

inflammation following phakinc IOL surgery.[2] Can occur due to various inciting factors including residual viscoelastic agent, glove powder, detergent residue on instrument tips, preservatives in intracameral medications, contamination solutions of intraocular lenses.[3] Mild case of TASS recover within weeks or months. Long standing severe cases develop secondary glaucoma and corneal decompensation as seen in our case. Early management with long term topical and systemic steroids can help prevent the sequelae of TASS.[4] In our case, aggressive steroid therapy and early explantation of phakic IOL may have been helpful in preventing the dreadful complications.

Incidence of TASS following phakic IOL surgeries are rare but few cases have been reported. Bogantes et al reported 6 eyes of 3 patients with TASS on the same day by the same surgeon following Visian ICL implantation. They analysed the potential factors to be handling of ICL or instrument tips with powdered gloves or intracameral medications like viscoelastic device, anaesthetic agent or epinephrine.[5] Gomez-Bastar et al. evaluated the long-term complication of 349 eyes of 216 patients undergoing ICL surgery. The overall complication rate was 3.72% with 1 case presenting with TASS (incidence of 0.29%).[6] Qi et al. reported a late onset case of TASS following V4c Visian ICL one month after surgery. Dense white spots were seen on posterior surface of ICL which resolved with intense steroid therapy. They hypothesized that acute onset TASS is due to inadequate sterilization and late onset TASS is likely due to intraocular lens contamination.[7] Li Li et al. reported two cases of late onset TASS after V4c ICL implantation 1 week after surgery. With intensive topical and systemic steroid therapy, both patients regained good vision. The author hypothesized the likely cause of TASS could be the use of naphazoline hydrochloride.[8]

TASS can be prevented by following proper protocols in the operating theatre including proper sterilization of all instruments, drying the lumen with forced compressed air after rinsing, removing enzymatic detergents from instruments with water jet. Use of fresh viscoelastic device, powder free gloves, intracameral drugs without preservatives is helpful in preventing TASS. Care must be taken to not touch the tips of instruments and lenses entering the anterior chamber with gloves.[2][5]

Adequate preoperative assessment and correct patient selection is very important to ensure good post operative visual outcome to prevent a series of complications for the patient. Following proper surgical and sterilization protocol is important to prevent TASS. Early suspicion and aggressive management is crucial to control TASS and prevent further sequelae.

Figures

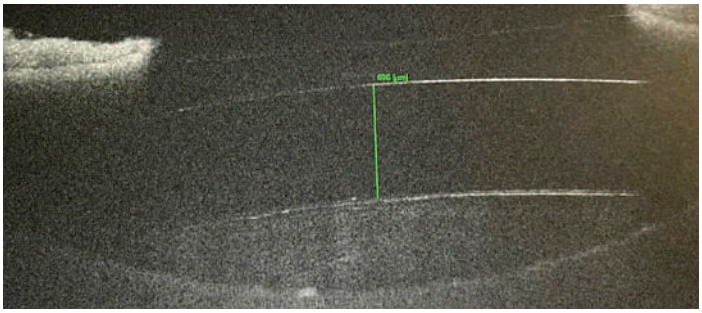

Figure 1: AS-OCT image of right eye showing ICL in situ with a high vault of 896 microns.

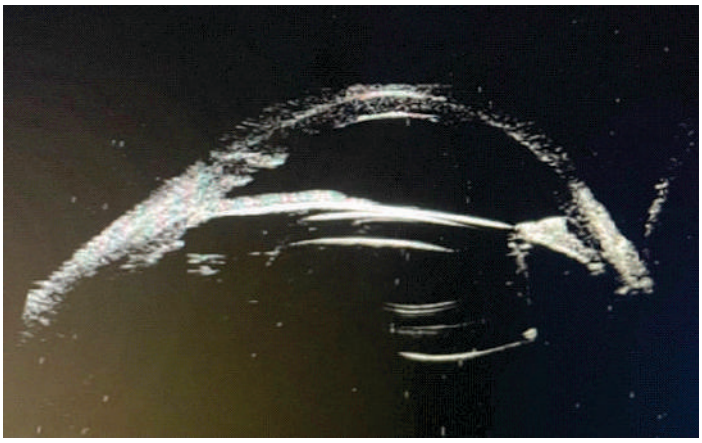

Figure 2: UBM image showing inferior angle PAS with ICL in situ with high vault

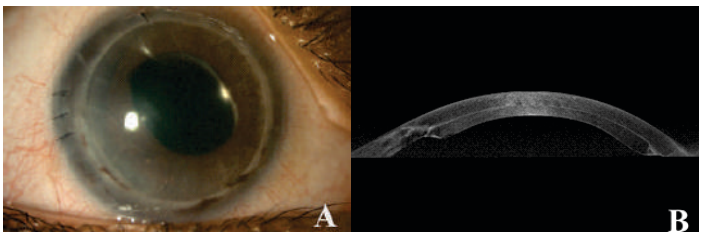

Figure 3: Post-operative slit lamp image of right eye showing DSEK graft insitu with posterior chamber intraocular lens in the bag [2a] and AS-OCT image showing well attached DSEK graft[2b].

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Simple And Quick Bedside Suture Less Amniotic Membrane Transplantation with PMMA Ring in Toxic Epidermal Necrolysis (TEN)

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Abstract

The purpose of this case report is to describe a new bedside surgical method for suture-less placement of the amniotic membrane with a PMMA ring in acute toxic epidermal necrolysis (TEN) that is quick, easier and more comfortable to patients. Stevens Johnson syndrome (SJS) and toxic epidermal necrolysis are on the same spectrum of severe, immune-mediated, mucocutaneous diseases. Ocular involvement occurs in the majority of cases

A 34 years old man developed severe ocular surface inflammation with total corneal and conjunctival epithelial defects secondary to TEN. He was treated by transplanting a large amniotic membrane graft and inserting PMMA ring under sedoanalgesia at bedside in the intensive care unit. The ocular surface was completely epithelized within 2 weeks.

Performing bilateral amniotic membrane transplantation with a PMMA ring at bedside led to excellent clinical outcome by reducing inflammation and protecting the ocular surface. Our technique can be performed at the bedside without the need for general anesthesia or operating room conditions. This minimizes the delay in AMT (Amniotic Membrane Transplantation) and is less invasive for the patient. As it is simpler and quick, it can be done by a surgeon with minimal expertise.

Introduction

Stevens-Johnson syndrome (SJS) and toxic epidermal necrosis (TEN) are rare, serious disorders of the skin and mucous membranes. Stevens-Johnson syndrome/toxic epidermal necrolysis are classified by the extent of the detached skin surface area [10,8,9]

- Stevens-Johnson syndrome: less than 10% body surface area
- Overlap of Stevens-Johnson syndrome/toxic epidermal necrolysis: 10% to 30% body surface area
- Toxic epidermal necrolysis more than 30% body surface area

It usually occurs as a reaction to medications that starts with flu-like symptoms, followed by a painful skin rash that spreads, blisters and peels off, typically occurring within the first few weeks after first the administration of medications. Mucous membranes including eyes, genitalia and mouth are also affected[10]. Acute ocular involvement is seen in 69%–84% of cases[12] of SJS/TEN and severe involvement can lead to corneal blindness. A literature review shows 40.29% patients of acute SJS/TEN in the Indian population had ocular complications[12,13]. In the acute phase, the eye is one of the most common organ systems affected. The largest published studies from India on chronic ocular complications related to SJS/TEN reported sixty percent of patients in the chronic phase presented with low vision or blindness. Lid abnormalities were observed in 97% eyes, conjunctival complications in 65% eyes, and corneal complications in 85% eyes.[11,12.] Secondary complications include sepsis, blindness, respiratory, and genitourinary scarring and dysfunction.

Early evaluation and treatment of patients with SJS and TEN are critical. Many studies have shown that amniotic membrane transplantation can suppress inflammation and facilitate healing if done in the acute phase of TEN [1-6]. AMT is usually done in the operating room unless the patient is too unstable to be transported.

We have described a novel method of AMT which can be done bedside that is quick, easier and more comfortable to patients.

Case Presentation

A 34-year-old male was admitted with a diagnosis of toxic epidermal necrolysis in isolation in ICU. His history revealed consumption of acelofenac for myalgia and fever. Next day the patient developed maculopapular rashes and vesicles over neck and face together with mucosal involvement. The patient was brought to our hospital for better care. The patient was admitted in the internal medicine department under the care of a dermatologist. Ophthalmology reference was put on the same day for the eye involvement.

On examination at bedside, the patient was found to have severe bilateral bulbar, palpebral conjunctival

inflammation and desquamation of the skin over lid (Fig 1).

Figure 1. Initial presentation of patient

The patient had bilateral total corneal epithelial defect on fluorescein staining and also lid margin staining. The patient was initiated on frequent instillation of preservative-free artificial tears containing sodium hyaluronate 0.18% w/v (Soha Liquigel, Sun Pharma). In addition, topical prednisolone acetate 1% (Pred Forte, Allergan, India) was prescribed six times daily, along with topical moxifloxacin 0.5% (Moxicip, Cipla, India). For eyelid involvement, a topical steroid ointment, fluorometholone (Flurisone, Microlabs, India), was applied to the lid margins.

Regular mechanical debridement of the pseudo membrane from the upper lid and lower lid was performed once daily using forceps under topical anesthesia with 0.5% proparacaine hydrochloride (Paracaine, Sun Pharmaceutical, India), followed by a saline wash. Symblepharon release was carried out daily using a cotton-tipped applicator. Despite repeated epithelial debridement, the corneal surface demonstrated unhealthy and loosely adherent epithelium. In view of a persistent corneal epithelial defect after one week of conservative management, the patient underwent amniotic membrane transplantation.

The patient remained in the critical care unit for altered renal function and hypovolemic shock, which prevented us from performing AMT in the operation theatre. The patient's serious clinical condition, intense laryngeal desquamation, and edema precluded him from receiving general anesthesia. So, it was decided to perform AMT at bedside under sedoanalgesia. Cryopreserved amniotic membrane was retrieved from a local eye bank. Amniotic membrane transplantation was planned with AMserter (Auro lab), the standard AMserter technique involves fixing amniotic membrane between two rings of the device to facilitate placement in the eye. However, due to the technical challenges encountered with the initial method, we developed a modified technique to simplify the procedure and enhance its practicality. This led to our new technique, wherein, after insertion of the lid speculum, the amniotic membrane is carefully spread across the ocular surface from fornix to fornix with the epithelial side facing upward (Fig2),

Figure 2. Showing Amniotic membrane transplantation

Figure 3. Showing insertion of PMMA ring (single ring of Amserter)

then inner ring of AMserter ™ (Fig 3) was gently placed on the ocular surface in the superior and inferior fornix over the membrane followed by application of

bandage contact lens. The rest of the membrane was tucked into the palpebral conjunctiva using forceps and the excess was trimmed with conjunctival scissors. The same procedure was performed in the contralateral eye. The procedure was completed within approximately 5–7 minutes for each eye. In this novel technique, drug absorption was good, and the corneal epithelial defect could be assessed daily using fluorescence staining. This approach avoided the limitations associated with a symblepharon ring, which can create pockets leading to dye pooling and a false impression of epithelial defects. Preoperative medications were continued in the postoperative period.

The postoperative stability of the amniotic membrane transplant was excellent. The membrane remained well-positioned throughout the postoperative period, with no evidence of folds or edge lifting in both the eyes.

Post operative day 2, the patient could open eyes completely, bedside vision was more than CF 4m (Fig 4). On postoperative day 3, the amniotic membrane and rings remained in situ, and the

Figure 4: Post operative day 2 photo showing amniotic membrane with PMMA ring

corneal epithelial defect had healed completely. Disintegration of the amniotic membrane was noticed after 6 days. The PMMA rings were gently lifted at the edges and removed using fine forceps on the 7th postoperative day (Fig 5).

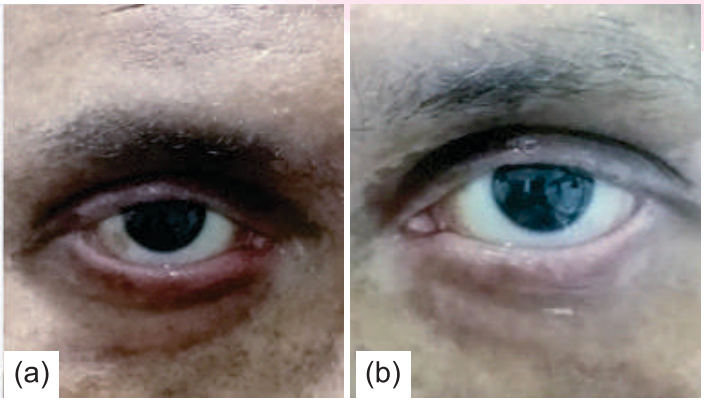

Figure 5: Post operative day 7 photo of (a) right eye; (b) left eye

On fluorescein instillation no staining was noted in both eyes. Conjunctival congestion had reduced significantly. There was no need for further AMT. On day 32, there was no corneal epithelial defect and the tarsal conjunctiva was epithelized, without keratinization. No scarring was noted. TBUT was >10sec in both eyes.
Mild diffuse corneal haze was observed only in the right eye on torchlight examination. In addition, mild trichiasis of the lower lid was noted in both eyes rubbing the cornea but there was no symblepharon formation.

Discussion

Severe cicatrizing ocular surface disease is one of the most significant and debilitating sequelae of SJS/TEN and can profoundly impact the patient's quality of life. There is a short window of opportunity during the acute stage where intervention may potentially avoid these lifelong complications including severe vision loss and blindness.

Early evaluation and treatment of patients with SJS and TEN are crucial. Recent studies have shown that AMT,[8,5,6,7] can suppress inflammation and help healing when done in the acute phase of TEN. The amnion has immunomodulatory effects and promotes epithelialization. The anti-inflammatory action of amniotic membrane may be due to downregulation of inflammatory cytokines released by activated lymphocytes and promotion of leukocyte apoptosis.
Various AMT techniques have been described previously, but it is a time-consuming and laborious surgery that is difficult to perform on patients who are unstable for surgical interventions because of systemic complications. Patients with acute TEN often do not receive AMT during the hyperacute phase because of high mortality risk associated with general anesthesia,

and unstable systemic conditions. Recently, many suture-less amniotic membrane fixation methods were described, which utilized different materials like pediatric nasogastric tube[2] symblepharon rings[3], cyanoacrylate glue[6] to secure the membrane in the fornixes.

Ma et al[7] described a technique for suture-less application of amniotic membrane in SJS patients using sterile intravenous tubing. Ceylan,et al[2] have utilized a Pediatric Nasogastric Tube to make a modified ocular surface ring in SJS/TEN cases

ProKera rings[4,5] though easier to apply the diameter of the ProKera only covers the cornea and perilimbal conjunctiva, thus making the fornices vulnerable to symblepharon formation. It is expensive and not easily available.

Our technique minimized symblepharon formation because of better coverage of the amnion membrane. PMMA rings are effective in keeping the fornices intact in conjunctival cicatricial diseases. The ring prevents adhesions and forniceal contractures without touching the cornea. Parul Chawla Gupta[1] et al described a similar technique using a Symblepharon ring fashioned from a Ryle's tube however the surgical duration in their method was 15–20 minutes per eye, compared to only 5–7 minutes per eye with our technique. In both symblepharon ring and Ryles tube rings there is possibility that the amniotic membrane and ring may become loose from the fornices but in our case ring snugly fits in the fornix without any movement. To our knowledge, this technique is first of its kind.
Our technique can be performed at the bedside without the need for general anesthesia or operating microscopes. This minimizes the delay in AMT and is less invasive for the patient.

The use of a PMMA ring with amniotic membrane to cover the ocular surface and fornices without the use of sutures or tissue glue as described here is fast, nontraumatic, technically easy, and seems to yield final outcomes comparable to those achieved with conventional AMT methods. The results of this study are in agreement with recently published reports that AMT performed in the acute phase of TEN is vital to prevent sight-threatening cicatrizing sequelae associated with ocular manifestations of the disease.

Conclusion

Our technique significantly reduced surgical time and is among the quickest and simplest methods described till date. The PMMA ring can be removed once the corneal epithelial defect has healed. Patient comfort is improved owing to the thin profile of the ring and the method is more cost-effective compared to fibrin glue. These advantages make the technique a practical option across diverse healthcare settings.

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Dual case of Periorbital Ticks: A case report

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Abstract

Purpose: This case report highlights two cases of periorbital ticks of two adults, with a history of travel to forest area who developed a small swelling next to lateral canthus, painful on touch with no visual or systemic complaints.

Methods: On examination both patients had a round bulbous foreign body next to lateral canthus, tightly adherent to skin, which could not be dislodged with forceps, and was associated with severe pain on attempt to remove it in OPD. Close examination under slit lamp and microscope revealed tiny legs, capitulum buried deep in the skin and a scutum suggestive of a tick. Tick was removed in toto using a microscope under local anaesthesia. Antibiotic-steroid ointment was given along with oral medications. A prophylaxis of oral doxycycline was added for two weeks to prevent rickettsial infections.

Results: Close examination showed that it was a hard tick in both cases. One of the patients developed pre-septal cellulitis after removal and needed antibiotics. Removal of tick in toto is key to prevent allergic reactions or infections.

Conclusion: Ticks have also been associated with localized lesions resembling erythema chronicum migrans, foreign body granuloma, lymphoid hyperplasia, tick-related alopecia and serious illness in form of Crimean Congo haemorrhagic fever. Tick in the eyelid is not as rare as we might think especially with specific travel history.

Introduction

Ticks are external parasites that live by feeding on the blood of mammals, birds, and sometimes reptiles and amphibians. They are widely distributed in the world especially in warm humid climates.[(1)]Ticks can transmit bacteria, viruses, and protozoa that infect hosts.[(2)] Rickettsia are a dangerous species of bacteria borne by ticks, responsible for typhus, Rocky Mountain spotted fever, [(3)] other tick-borne diseases include Lyme disease and Q fever, Colorado tick fever, Crimean–Congo haemorrhagic fever, tularaemia, tick-borne relapsing fever, babesiosis, ehrlichiosis, Bourbon virus, and tick-borne meningoencephalitis, as well as bovine anaplasmosis and the Heartland virus.[(4)]

There have been very few cases reported about periocular tick infection especially in the subcontinent. This case report details two such cases seen in a span of a week at a tertiary care hospital and includes the findings, treatment options and etymology.

Methods

Case 1: A 25-year-old male with history of trekking in Western Ghats three days back presented with pain at the right eye lateral canthus with a small foreign body at the site. (Fig 1).

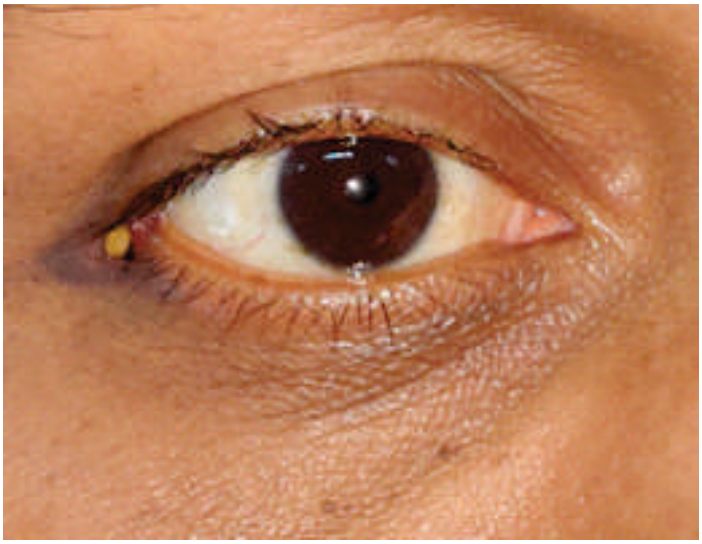

Fig 1: Foreign body at the lateral canthus of Case 1

He visited an ophthalmologist 3 days after the incident. On attempted removal of the foreign body, patient had intense pain and burning sensation hence attempt was abandoned. Alcohol swab was tried to remove the foreign body in suspicion of insect, but in vain. He was then referred to us, and preliminary examination showed a round body with legs and outer hard shell, and it was alive and moving

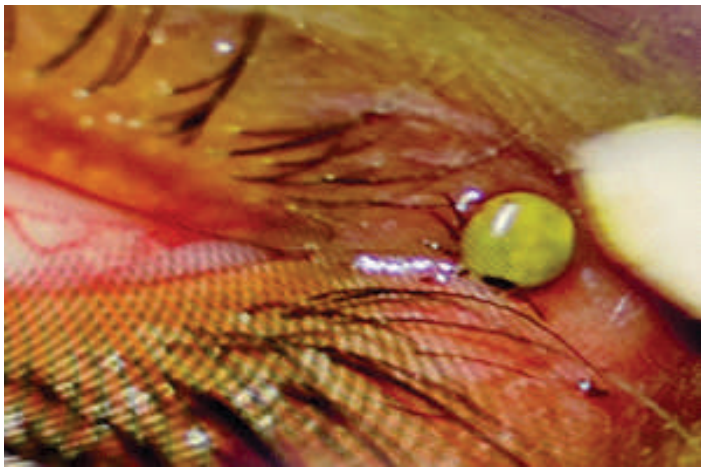

Fig 2: Examination revealed hard tick

There were no associated intraocular pathologies, vision was 6/6 both eyes with normal extra-ocular movements and fundus exam. Immediate exploration and removal in toto were done **(Fig 3).**

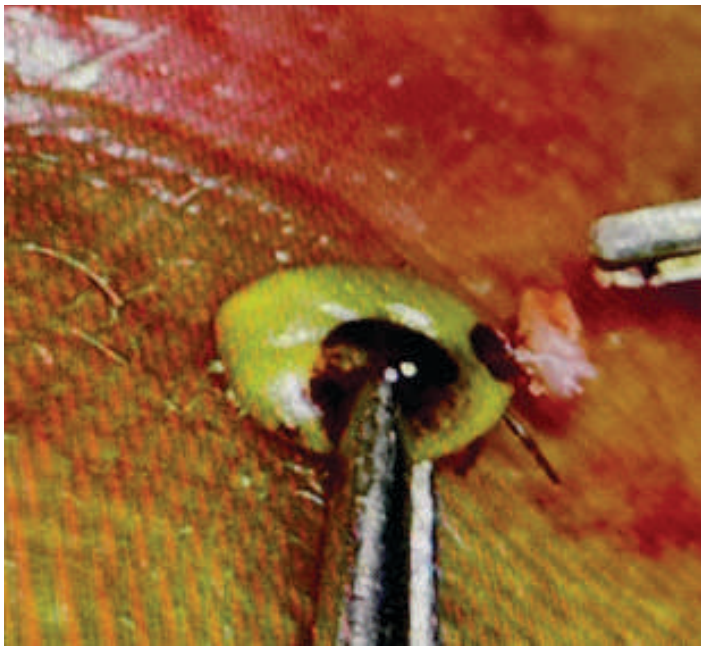

Fig 3 : In toto removal of the tick

The insect was examined and a quick google search revealed it to be a hard tick with scutum, six legs and mouth parts. **(Fig 4)**

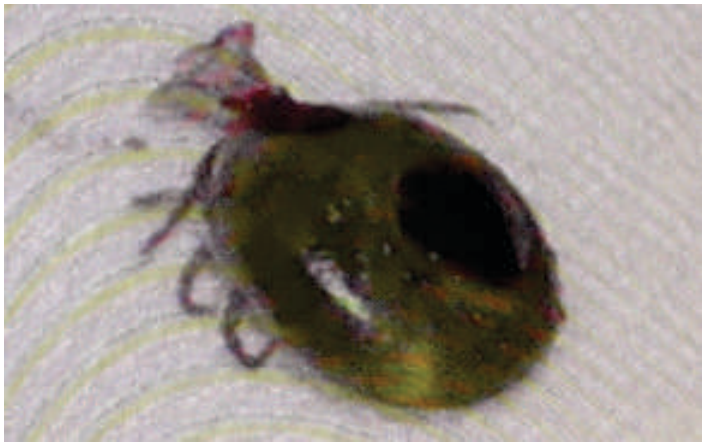

Fig 4 : The whole tick with scutum, legs, mouth parts and some soft tissue adherent to mouth

Bed of the wound was inspected for any remnants and thoroughly washed with betadine solution and closed with 6-0 vicryl. Patient did well during immediate post operative period. However, he developed pre-septal cellulitis two days later **(Fig 5)**

Fig 5 : Right eye Pre-septal cellulitis

CT orbit was done which confirmed pre-septal cellulitis. Orbit was normal **(Fig 6)**.

Fig 6: CT showing pre-septal cellulitis

It subsided with oral antibiotics and anti-inflammatory medications **(Fig 7).**

Fig 7: Complete recovery one week after treatment

He was given a course of oral Doxycycline to prevent rickettsial infections.

Case 2: A 50-year-old female presented with foreign body in her right eyelid for 2 days with pain, not removable by self and intense burning sensation on

attempted removal **(Fig 8).**

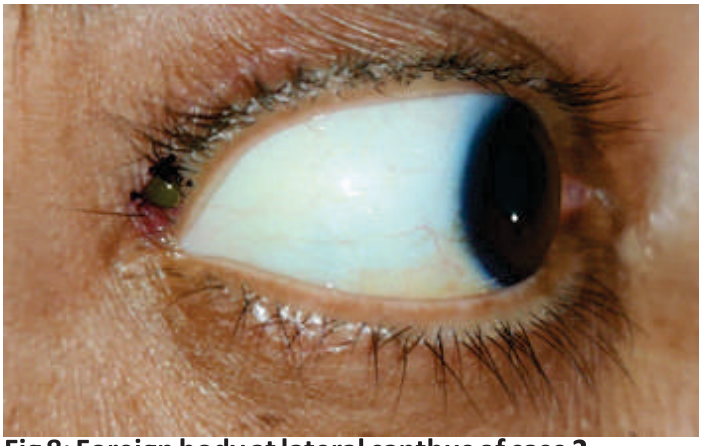

Fig 8: Foreign body at lateral canthus of case 2

Patient had history of visit to Dandeli forest area. On examination, she had a single tick in right upper lid, adherent, alive and moving **(Fig 9)** .

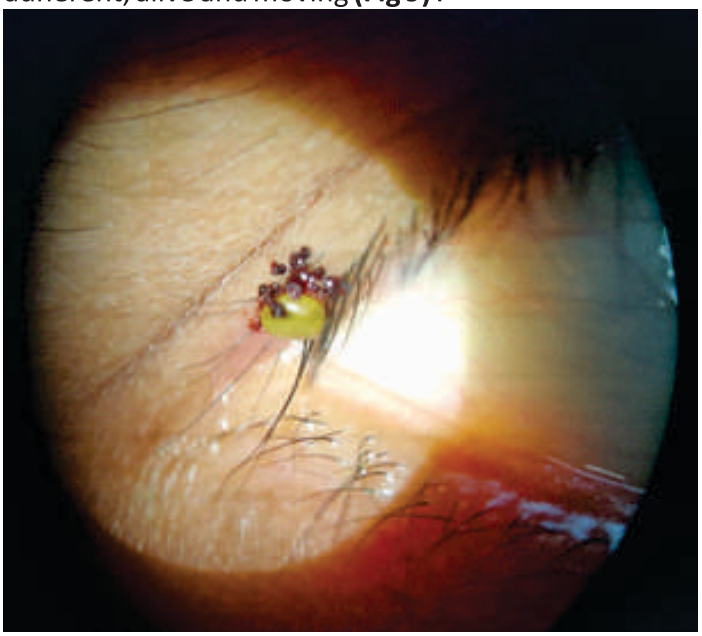

Fig 9 : Close examination showing hard tick

There were no significant intraocular findings except refractive error. She was immediately taken up for exploration and in toto removal of the tick and given prophylactic medications. She made a full uneventful recovery following the procedure.

Discussion

Hard ticks are the ones with a head, mouth parts, scutum and legs and which usually affect humans. (Fig 10)

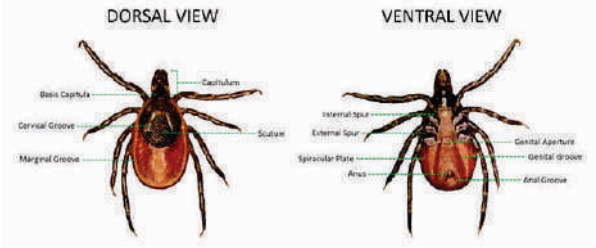

Fig 10 : Parts of Tick. (*Pic courtesy : Griffin Dill, University of Maine)*

Soft ticks lack scutum, are larger and there have been no reports of them being found attached to any areas of the body in humans.

Both the cases had a history of visit to forest area near western ghats. Ticks are found in environments visited by both humans and wildlife. The Tick prone areas in South India are the Western ghats, Wayanad districts of Kerala and Sirumalai area in Eastern ghats in Tamil Nadu. [5] Kyasanur forest disease is a tick-borne disease that has been primarily reported in Karnataka. [6]

John et al reported two cases of periocular tick bites. [7] According to this report, two patients presented to them in a span of three days, with due suspicion and magnification of lesions revealed the ticks which otherwise masqueraded as small skin tags or moles on gross examination. In our cases, the ticks were originally thought to be skin tags or other foreign bodies and detailed examination on slit lamp 45x magnification revealed the presence of ticks. Hence high suspicion with detailed history taking can help in early and accurate diagnosis.

Overall, only 20-25 isolated cases of periocular infestation have been reported in literature. Aslihan Uzun et al reported two cases of lid infestation by ticks which were removed with forceps without any post operative complications [8]. However, Oliver Bowes et al described a case of a 35 year day tripper with eyelid tick, removed with forceps which caused disembodiment and retention of mouth parts which was later removed surgically. [9] In both our cases, the tick was tightly adherent to the underneath tissue making removal by forceps impossible. Complete surgical excision is important to prevent disembodiment and further inflammation. Since the tick was still alive in both cases, we can conclude that the tick was holding onto the tissues with its mouth and the saliva coming in contact with tissues caused the intense burning sensation and resistance to removal. The saliva of the tick has peptidic molecules that aid in pathogen transfer, prevent blood from clotting, inhibit inflammation and help them attach to and feed on a host undisturbed. [10] This explains why both our patients did not notice when the tick first latched on to the eyelid and only presented to us when pain and burning started.

Interestingly, Gopi et al published a case report with tick on the eyelid embedded in the skin present since a week and removed by local 2% lignocaine injection. [11] The tick just fell off once lignocaine was injected due to the tissue oedema which dislodged the tick.

None of the above reported cases had any post removal complications. Puthalath et al- published a case report where patient presented with tick with pre-septal cellulitis history since one week and was treated by mechanical removal of the tick and antibiotics [12]. One of our cases also has pre-septal cellulitis which resolved with antibiotics. The incidence of cellulitis may be subjective and not directly related to tick properties and can be easily managed medically. Though prophylaxis with doxycycline has not been described in literature, the authors would recommend a two-week course of oral Doxycycline twice a day to prevent any potential rickettsial infections which can be more dangerous.

Identifying the Tick species with the help of an etymologist can give a clue as to the diseases that might be caused by that particular tick species but may not always be practically possible.

Conclusion:

Tick in the eyelid is not as rare as we might think especially in travellers of a specific area. There are no reports of tick infestations, but isolated cases of tick bite have been reported. More often than not, the tick remains at the site of bite holding on with the mouth parts and needs due suspicion and meticulous complete removal to prevent complications.

Tick bites have also been associated with localized lesions resembling erythema chronicum migrans, foreign body granuloma and lymphoid hyperplasia. There are two cases reported with pre-septal cellulitis including our case. Other serious complications of tick bite include tick-related alopecia, Lyme disease (which affects joints, heart and nervous system), Tick borne encephalitis and Rocky Mountain Spotted fever (includes rash, respiratory distress and pulmonary oedema). Hence Post exposure prophylaxis might help mitigate these serious illnesses. Close follow up to rule out other tick-borne diseases in such patients of tick bites is recommended.

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Central Serous Chorioretinopathy in Pregnancy: Role of Focal Laser Guided by OCT Without Fluorescein Angiography

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Abstract

***Background*:** Central serous chorioretinopathy (CSCR) is an uncommon retinal disorder during pregnancy, attributed to hormonal and hemodynamic changes.

Presentation: We report a 39-year-old woman, gravida 2 para 1, at 33 weeks of gestation, who presented with blurring of vision in her right eye for 3 weeks. Best corrected visual acuity (BCVA) was 6/18, N8 in the right eye and 6/6, N6 in the left eye. Optical coherence tomography (OCT) revealed neurosensory detachment with subretinal hyper-reflective material in right eye. Without the use of fluorescein angiography, a frequency doubled Nd:YAG laser was applied to the presumed leakage site guided by OCT. At 2-months follow-up post laser, the subretinal fluid had completely resolved, and BCVA improved to 6/6, N6.

Conclusion: This case highlights the potential of OCT guided focal laser as a safe and effective alternative to fluorescein angiography guided treatment of CSCR in pregnancy.

Keywords

Central serous chorioretinopathy; pregnancy; OCT; focal laser; subretinal fluid

Abbreviations

BCVA - Best corrected visual acuity, CSCR - Central serous chorioretinopathy, FFA - Fundus fluorescein angiography, LE - Left eye, Nd:YAG - Neodymium-doped Yttrium Aluminum Garnet, NSD - Neurosensory detachment, OCT - Optical coherence tomography, RE - Right eye, RPE - Retinal pigment epithelium, SRF - Subretinal Fluid

Introduction

Central serous chorioretinopathy (CSCR) is characterized by serous detachment of the neurosensory retina, typically affecting young to middle-aged adults. It is relatively rare during pregnancy, with an estimated incidence of 0.008%–0.01%,[1] usually manifesting in the third trimester due to increased endogenous corticosteroids, vascular instability, and choroidal hyperpermeability.[2] Most cases resolve spontaneously postpartum; however, persistent or visually significant fluid may require intervention.[3]

Fundus fluorescein angiography (FFA) is traditionally used to localize leakage points for laser treatment, but its use is relatively contraindicated during pregnancy. It is classified as a category C drug as there is a lack of well-controlled studies assessing the safety of intravenous fluorescein in pregnancy.[4] Optical coherence tomography (OCT) offers a non-invasive and safe alternative for identifying subretinal fluid and guiding treatment.[5]

We report a case of pregnancy-associated CSCR successfully treated with OCT-guided focal laser achieving complete resolution without FFA or systemic therapy.

Case Report

A 39-year-old woman, gravida 2 para 1, at 33 weeks of gestation, presented with blurring of vision in her right eye (RE) for 3 weeks. She had a history of gestational diabetes mellitus controlled with diet. There was no history of hypertension, corticosteroid use, or previous ocular disease.

On examination, best-corrected visual acuity (BCVA) was 6/18, N8 in the RE and 6/6, N6 in the left eye (LE). Intraocular pressure and anterior segment evaluation was within normal limits in both eyes. Fundus examination of the RE showed a localized area of serous retinal detachment with subretinal fibrinous exudates involving the macula (Figure 1a). The LE fundus was normal.

Swept source OCT of the RE revealed a well-defined sub foveal neurosensory detachment (NSD) with subretinal hyper-reflective material suggestive of fibrinous exudate which was observed around the leakage site (Figure 1b). There was sagging or dipping of the posterior layer of the neurosensory retina with retinal pigment epithelium (RPE) bump corresponding to leakage site[5] (Figure 1c). The central macular thickness was elevated. Based on clinical and OCT findings, a diagnosis of pregnancy-associated CSCR was made.

Due to the patient's pregnancy, fluorescein angiography was deferred. The presumed site of leakage was localized using OCT guided by the area where retinal dipping above the RPE bump with subretinal fibrinous exudates was noted (Fig1 with asterisk).[5] The patient underwent frequency doubled Nd:YAG laser photocoagulation (50-100 mW, 100 ms, spot size 100 µm) with 532nm wavelength to the area adjacent to the suspected leakage site under strict safety precautions.

Patient underwent uneventful normal vaginal delivery at 38 weeks of gestation. At 2 months follow-up post laser treatment (3 weeks postpartum), RE BCVA improved to 6/6, N6, with complete resolution of neurosensory detachment and restoration of foveal contour (Figure 2). No recurrence was observed postpartum.

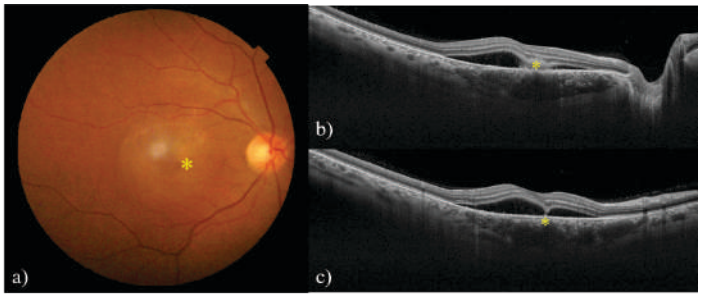

Figure 1

a) Fundus picture of the RE showing localized area of serous retinal detachment with subretinal fibrinous exudates involving the macula
b) RE OCT showing well-defined sub foveal neurosensory detachment with subretinal hyper-reflective material around the leakage site
c) RE OCT showing sagging or dipping of the posterior layer of the neurosensory retina over the RPE bump suggestive of leakage site

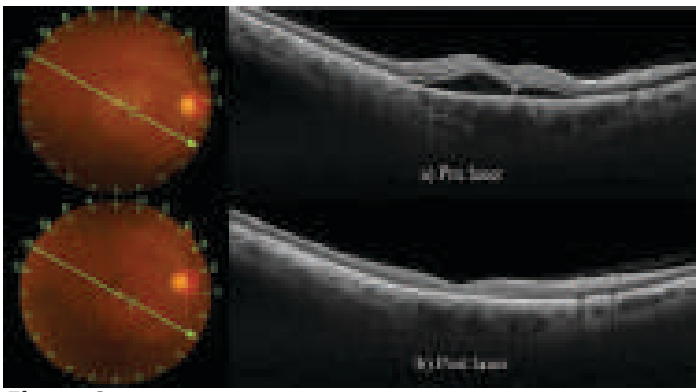

Figure 2

a) Pre-treatment OCT showing neurosensory detachment with RPE bump
b) Post-treatment OCT showing complete resolution of subretinal fluid

Discussion

Pregnancy-related CSCR is typically associated with elevated circulating cortisol, catecholamines, and increased choroidal vascular permeability. The condition most often arises in the third trimester and may resolve spontaneously after delivery.[2,6] However, prolonged subretinal fluid may pose risk to visual recovery.[5]

Fluorescein angiography, the standard tool to identify leakage points, is relatively contraindicated during pregnancy.[4] OCT served as a safe, non-invasive guide to localize the site of serous detachment, area of leakage and monitor anatomical response. Kim et al observed a highly reflective area suggesting fibrinous exudate in the subretinal space around the leakage site along with sagging or dipping of the posterior layer of the neurosensory retina over the RPE bump suggestive of leakage site. This was presumed to arise from the swelling of the outer nuclear layer due to the traction by fibrinous exudates.[5]

Frequency doubled Nd: YAG laser induces mild thermal injury that stimulates RPE proliferation and migration, sealing the leak and restoring outer blood-retina barrier integrity, leading to subretinal fluid (SRF) resolution.[7,8]

It is known that natural course of CSCR during pregnancy is usually benign, with spontaneous resolution of subretinal fluid within one to three months after delivery.[2,6] However, we cannot rule out the possibility of focal laser being helpful in accentuating the resolution of SRF at 3 weeks postpartum as seen in our case. In view of significant visual needs and deteriorating vision, we considered opting for laser therapy over observation in this case. In our patient, OCT documented complete reattachment within two months post treatment, confirming effective anatomical and functional recovery. This case supports the growing evidence that OCT-guided focal laser, offers a safe and effective management approach for visually significant CSCR during pregnancy when FFA is avoided.

Conclusion

OCT-guided focal laser photocoagulation can be a valuable and safe treatment option for pregnancy-related CSCR when fluorescein angiography is contraindicated.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given consent for her images and clinical

information to be reported. The patient understands that her name and initials will not be published, and due efforts will be made to conceal her identity.

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Nil.

Conflicts of interest
There are no conflicts of interest.

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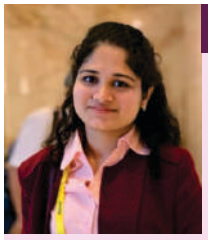

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Clinical features and treatment Strategies for Angle Recession Glaucoma

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Abstract

Introduction:
Angle Recession Glaucoma (ARG) is a Secondary Open Angle Glaucoma. Risk of glaucoma is directly proportional to number of clock-hours of angle recession and extent of trabecular meshwork damage.

Case Report:
This is a case of a 56-year-old male who developed ARG post trauma. Although the patient maintained his IOP with medical management for a period of 3 years, his IOP and visual-field showed glaucomatous changes for which filtering surgery was performed.

Discussion:
Although classical features like hyphema was absent, quick progression was attributed to 360-degree angle recession. Trabeculectomy surgery was performed and long-term pressures were controlled as observed on frequent follow-up.

Conclusion:
Late raise in IOP could be result of long-term scarring and fibrosis of the trabecular meshwork and Schlemm's canal. Use of an antifibrinolytic agent can decrease the failure of Trabeculectomy surgery especially in younger patients, where chances of occurrence of a bleb failure are higher.

Keywords
Angle Recession Glaucoma, Traumatic Glaucoma, Secondary Glaucoma

Introduction

Angle Recession Glaucoma (ARG) is a Secondary Open Angle Glaucoma associated with a tear between circular and longitudinal muscles of the ciliary body and the diagnosis is made on slit lamp examination and gonioscopy. Angle recession is usually associated with traumatic hyphema and can develop even after 10 years post trauma in 10% patients as observed by Kaufman et al.[1] The number of clock hours of angle recession and extent of trabecular meshwork damage are direct risk factors in the development of this type of glaucoma.[2] Our case highlights the aspect of quick progression of glaucoma post trauma when the extent of recession is larger.

Case Report

A 56-year-old male presented with complaints of sudden and painful decrease in vision in the right eye following accidental trauma with a tennis racket. His best corrected visual acuity (BCVA) was HM close to face in the right eye and 6/6 in the left eye. The intraocular pressure (IOP) on applanation tonometry was 46 and 18-mm Hg in both eyes. Anterior segment findings were as seen in Figure 1. Dilated fundus examination was normal and Gonioscopy was as seen in Figure 2 and Figure 3. Patient was started on topical steroids and cycloplegics along with Brimonidine, Timolol and Dorzolamide eye drops. Follow-up IOP was 17mm Hg. HFA 24-2 SITA Standard Humphrey's visual field analysis was normal in both eyes. Pachymetry was 498 and 497 micrometres. One year later, a raised IOP of 34 mm Hg was noted in the right eye and fundus showed a CDR of 0.5 with a healthy NRR. Patient denied any non-compliance to treatment. He was asked to use Dorzolamide, Timolol and Bimatoprost eye drops in the right eye. Patient was stable for the next one year with this treatment. The patient was then lost to follow-up after three years and showed an IOP of 28 mm Hg with a CDR of 0.7 with early inferior thinning of NRR. His visual field analysis showed a superior arcuate scotoma. Additional Rho-Kinase inhibitors were started but despite maximum medical therapy, progression of the disease was seen and patient was advised Trabeculectomy surgery with Mitomycin C (MMC) in the right eye.

Diagnosis:

Right eye: Chronic Angle Recession Glaucoma secondary to blunt trauma to the eye and Left eye within normal limits.

The patient has been on regular follow-up and is currently not using any antiglaucoma medications and his vision is 6/6 parts in the right eye. The patient is also maintaining a stable IOP of around 12-14 mm Hg. The visual acuity, mean IOP and fundus examination was recorded during each follow-up and was normal.

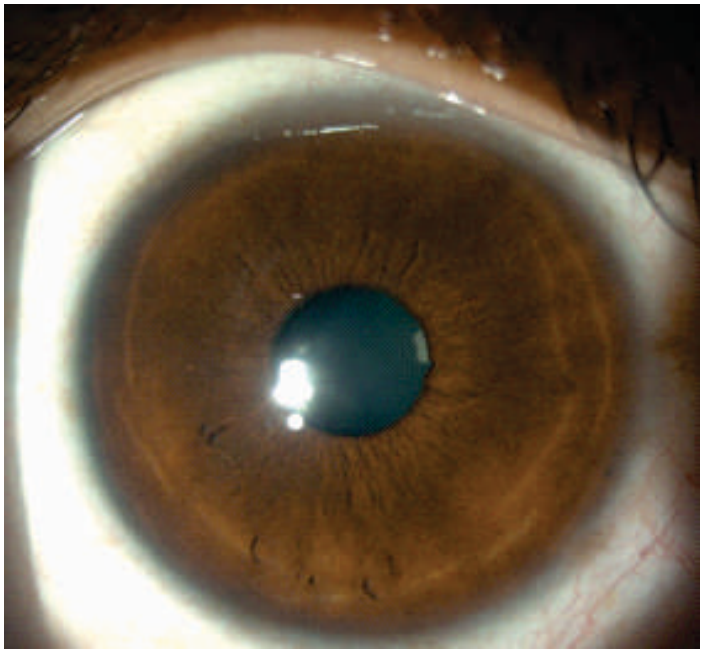

Figure 1: Shows the anterior segment examination of the right eye post trauma. There was traumatic mydriasis with multiple sphincter tears

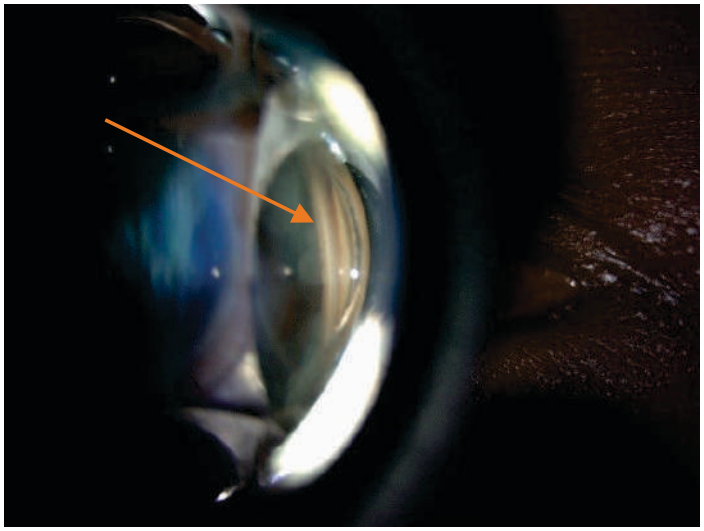

Figure 2

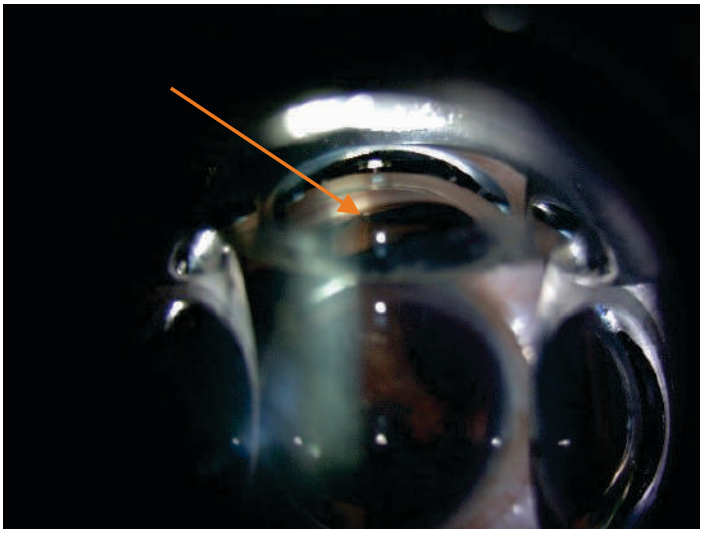

Figure 3

Gonioscopy revealed widening of the ciliary body band with diffuse pigmentation in all four quadrants in the right eye, suggestive of 360-degree angle recession

Investigations and management

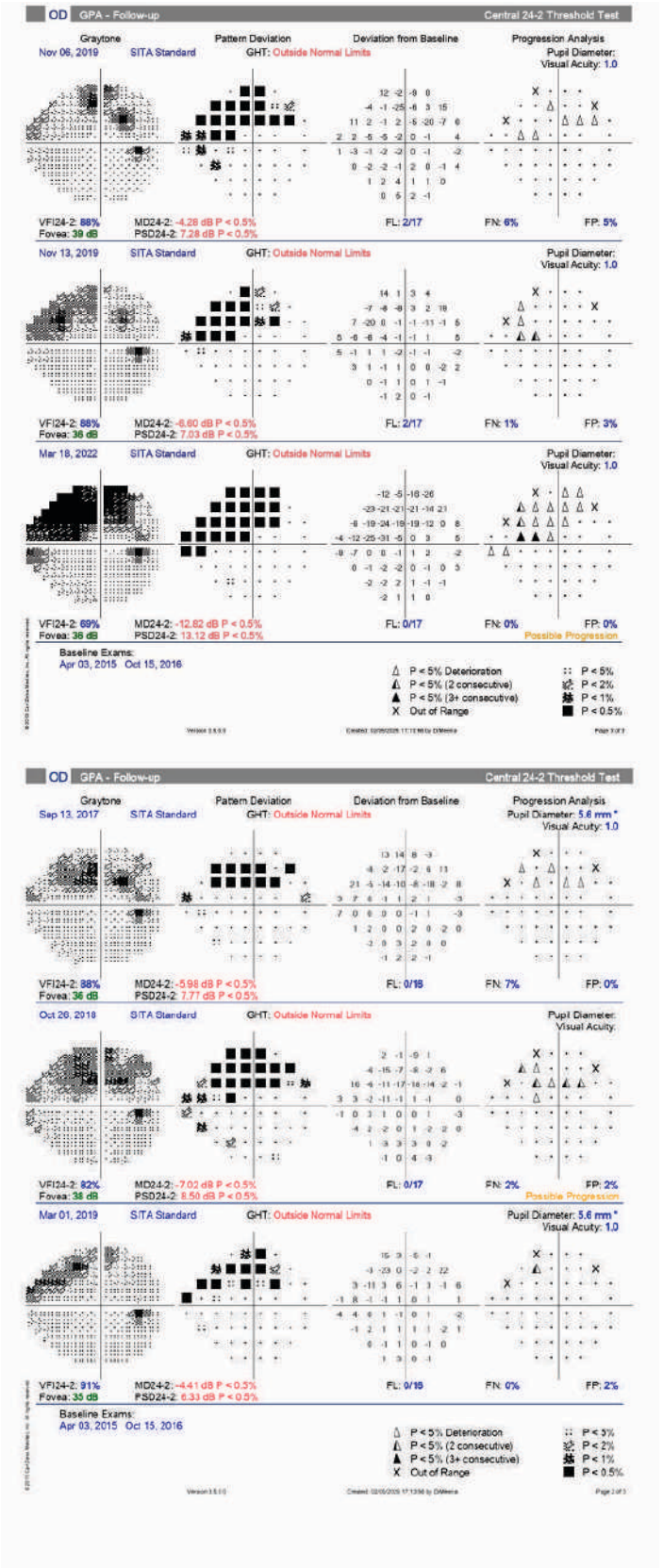

Figure 4:

Shows HFA-Glaucoma Progression Analysis shows a progression in the superior arcuate scotoma from the time of trauma until the time the patient underwent Trabeculectomy surgery in the right eye.

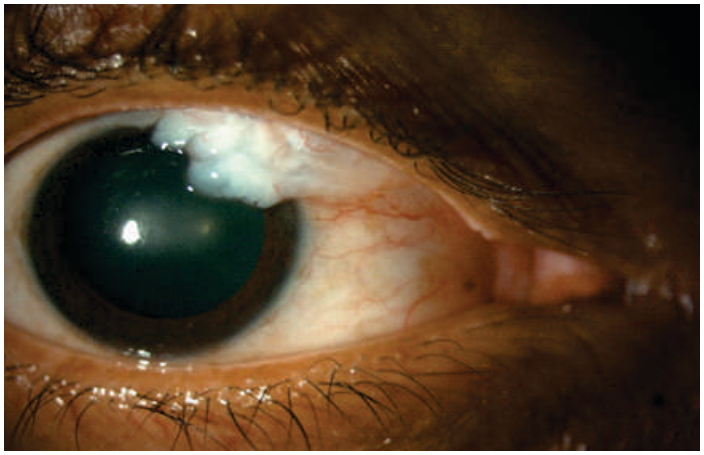

Figure 5: Shows post-surgical picture of the right eye showing a superior- nasal conjunctival trabeculectomy bleb (H3E3V0 S0)-According to The Indiana Bleb Grading System).

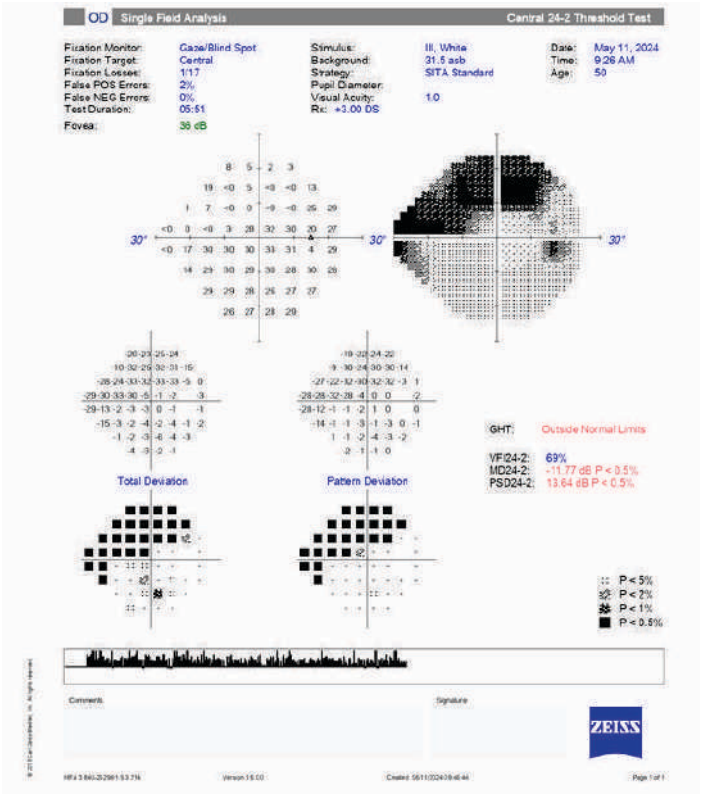

Figure 6: Shows the HFA 24-2 SITA Standard visual field analysis of the Right eye done in May 2024-Showing the superior arcuate scotoma which has not progressed post-surgical management.

Discussion

ARG is associated with a gradual, progressive loss of vision. There are reports of glaucoma developing in patients post trauma even after 50 years. In the above case, the patient developed a superior arcuate scotoma and disc changes along with raised IOP after 3 years post the injury.[3]

The proposed mechanism is that blunt trauma forces aqueous humour laterally and posteriorly against the iris and the angle exerting traction on the iris root leading to the tear in the muscles of the ciliary body. This force can also break the ciliary arteries leading to hyphema. Although there is a strong association (60-100%) of angle recession with traumatic hyphema, our case did not develop hyphema and this could be attributed to the force of trauma.[4]

Sihota, et al. reported angle pigmentation, elevated baseline IOP, displacement of lens, hyphema and angle recession of more than 180 degrees were significant factors for glaucoma after a closed globe injury. The IOP rise is related to damage of trabecular meshwork rather than angle recession itself, although risk of glaucoma is related to the number of clock hours of angle recession. Our case saw quick progression of glaucoma in the first 3 years post injury due to complete 360 degrees of angle recession.[5]

One study shows that the risk of angle recession glaucoma can increase in the contralateral eye in 50% of patients with angle recession glaucoma which was not seen in our case. Nevertheless, the contralateral eye needs monitoring for glaucoma on a long- term basis.[6]

There is a hypothesis that angle recession may not directly cause elevated IOP but may accelerate the process in an eye already at risk.[7]

Initial medical management can be a beta-blocker or a prostaglandin analogue. The response is assessed against a target IOP after 4-8 weeks and if satisfactory reviewed again after 3-6 months. If there is little response to initial therapy, withdraw the initial drug and substitute it with another drug. If the initial drug response is not adequate, we can add another drug or a fixed combination drug.

Laser trabeculoplasty is of little benefit in cases of ARG, especially in young patients and the treatment of choice is usually Trabeculectomy with an adjunctive antimetabolite as the progression is faster when the extent is more. Sirisha Senthil et al, showed that Trabeculectomy with MMC in phakic eyes with traumatic angle recession glaucoma showed good safety and efficacy in the medium- term follow-up. [8] Glaucoma Drainage Devices can be considered if trabeculectomy fails.

Conclusion

The initial rise in IOP in our case could be the result of damage to the trabecular meshwork and Schlemm's canal. However, the rise in IOP after 2 years of medical management could be result of long-term scarring and fibrosis of the trabecular meshwork and Schlemm's canal. In such cases, a trabeculectomy surgery with an antimetabolite can help to control the IOP as was done in our case. Studies have also shown that there is no significant difference in the time of contact of MMC but the use of an antifibrinolytic agent can decrease the failure of a Trabeculectomy. Moreover, the younger the patient, the more chances of occurrence of a bleb failure.[9]

Careful follow-up to check on the alternative mechanisms of rise in the IOP due to the loss of tension of ciliary muscle on the scleral spur thereby narrowing the Schlemm's canal or wherein a hyaline membrane can grow across the trabecular meshwork thereby decreasing the aqueous outflow are essential in these cases.[10]

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Focal choroidal excavation (FCE) after multiple intra-vitreal anti-vascular growth factor injections in polypoidal choroidal vasculopathy

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Abstract

Purpose:

To describe a case of polypoidal choroidal vasculopathy (PCV) showing a newly developed focal choroidal excavation (FCE) when treated with multiple intra-vitreal anti-vascular endothelial growth factors (anti-VEGF) injections.

Methods:

A 58-year-old gentleman was referred for the treatment of left eye (LE) age-related macular degeneration. His best corrected visual acuity (BCVA) at initial presentation was 6/6 in both eyes (BE). Right eye fundus was unremarkable whereas the LE showed an orange lesion with retinal pigment epithelium (RPE) mottling nasal to the fovea. Spectral domain optical coherence tomography (SD-OCT) of LE revealed a steep retinal pigment epithelium detachment (PED) nasal to the fovea with sub-retinal fluid and the corresponding area on indocyanine green angiography (ICGA) showed a polypoidal lesion (PL) confirming the diagnosis of PCV with Pachychoroid features. He was treated with multiple intravitreal anti-VEGF injections on a pro-re-nata basis for the same.

Results:

After two years of treatment, the sharp PED began to shrink and a novel FCE gradually emerged with an inner choroidal layer attenuation.

Conclusion:

Formation of a novel FCE in a case of PCV can be due to atrophy of the polypoidal lesion and decrease in the blood flow in inner choroidal vasculature after repeating multiple anti-VEGF injections.

Introduction:

Focal choroidal excavation (FCE) is a relatively recently recognized disease characterized by a localized area of excavation of the choroid, without evidence of a posterior staphyloma or scleral ectasia.[1] Initially, FCE was considered to be a stable congenital abnormality, but it was later found to be complicated by various chorio-retinal diseases, including central serous chorioretinopathy (CSCR), age-related macular degeneration (ARMD) with choroidal neovascularization (CNV), and polypoidal choroidal vasculopathy (PCV).[2–4] FCE is considered as a disorder belonging to pachychoroid spectrum.[5] However, its pathogenesis is still unclear. Although several publications have reported the imaging features, a detailed description of the process of FCE formation over time has not been reported. We report the clinical course of a case of acquired FCE associated with PCV.

Case Report

A 64-year-old gentleman was diagnosed with left eye (LE) ARMD elsewhere in January 2018 and was treated with intra-vitreal anti-vascular endothelial growth factor (anti-VEGF) injection for the same. On his first visit with us, his best corrected visual acuity (BCVA) was 6/6 in both eyes (BE). Anterior segment (BE) was within normal limits. The fundoscopic examination of right eye (RE) was unremarkable whereas LE showed an orange lesion with retinal pigment epithelium (RPE) mottling nasal to the fovea.(Figure 1A). Spectral domain optical coherence tomography (SD-OCT) of LE revealed sharp-peaked retinal pigment epithelial detachment (PED) and sub-retinal fluid nasal to the fovea (Figure 1C) and the same area on indocyanine green angiography (ICGA) revealed polypoidal lesions (PL) (LE) (Figure 1B). Based on the above findings, the patient was diagnosed with LE PCV and treated with anti-VEGF monotherapy on a pro-re-nata (PRN) basis.

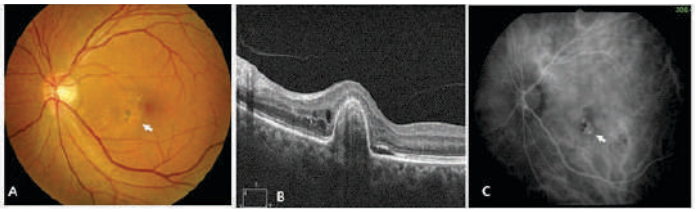

Fig. 1. Fundus photograph, ICGA and SD-OCT at the initial presentation.

A. Fundus photograph showing orange-red nodular lesion with pigmentary mottling infero-nasal to the fovea in the LE (arrow). B. SD-OCT- showing thumb-shaped PED with exudative changes (minimal sub-

retinal and intra-retinal fluid). C. Indocyanine green angiography- PL with nodular hyperfluorescence (arrow).

With anti-VEGF injections, attenuation of the orange lesion on clinical examination and reduction in the size of sharp PED was noted. (Figure 2, A and B). Four years after the initial visit, a tiny choroidal excavation was noted adjacent to the PED which significantly increased in the depth(Figure 2C) along with attenuation of the inner choroidal layer (Figure 2D). On his last visit with us in June 2024, his BCVA (LE) was 6/6 with (fundoscopic findings of LE on last visit to be added) no exudative changes on OCT. The choroidal thickness in the area adjacent to the sharp PED decreased from 410 µ m to 140 µ m over the past 4 years. Conversely, no significant changes were observed in the choroidal thickness 1 mm temporal from the fovea throughout the follow-up.

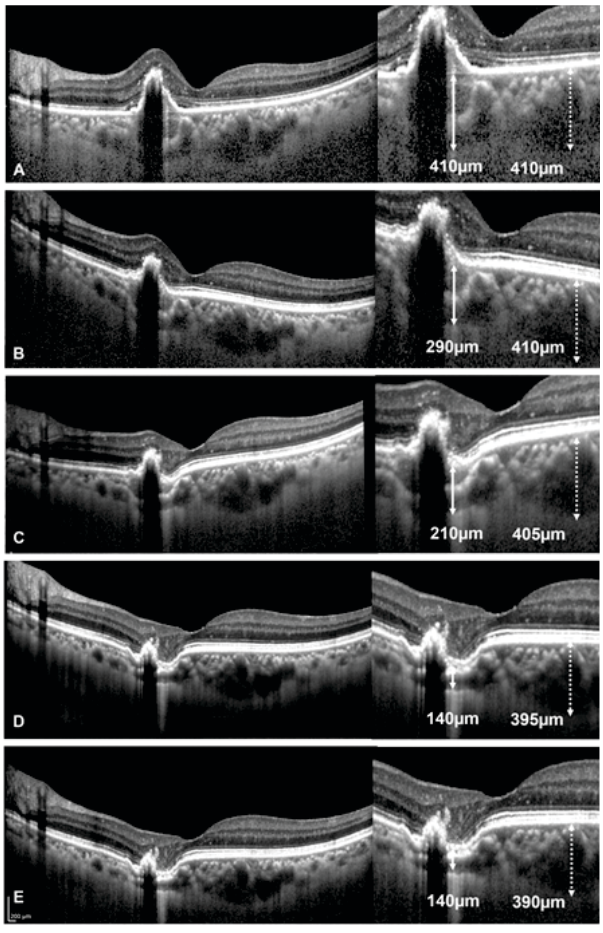

Fig. 2. Serial SD-OCT (LE) images through a sharp PED. At 36 months- The PED reduced in size with hyper-reflectivity on the top. The choroidal thickness in the area adjacent to the PED (solid line) was 410 μm.

B. At 44 months - The PED had further reduced in size, and the choroidal thickness decreased to 290 μm.

C. At 55 months- A tiny choroidal excavation was observed to the temporal side of the PED with a decreased choroidal thickness of 210 μm.

D. At 66 months- The choroidal excavation extended around the PED and increased the depth. In the area of choroidal excavation, a hyper-reflective lesion was observed below the RPE with a disrupted ellipsoid zone. The choroidal thickness further decreased to 140 μm.

E. At 74 months - The size and depth of the choroidal excavation had not changed thereafter. The change in choroidal thickness in the area 1 mm temporal from the fovea (dashed line) was not significant throughout this period.

Discussion:

FCE is known to be acquired in association with choroidal abnormalities such as CSCR, CNV, and PCV in addition to congenital morphologic abnormalities. Therefore, it has recently been linked to pachychoroid-related diseases.[5] The frequency of FCE in eyes with PCV is estimated to be 6%.[6] Although previous studies suggest a relationship between PCV and FCE, very limited information is available regarding the mechanism and process of FCE formation in eyes with PCV. Lee et al showed the formation of a new excavation in an eye with CNV and enlargement of the excavation area in one eye with PCV. [3] Shah et al reported a case of FCE development in eyes treated with anti-VEGF therapy for CNV.[7] However, these case reports do not describe detailed OCT changes that lead to the formation of FCE associated with CNV. This is the first report of a detailed observation using OCT for the process of FCE formation in association with anti-VEGF therapy for PCV over a period of 4 years. The pathogenesis of FCE is still unclear, but the possibilities include acquired choroidal inflammation, which can produce choroidal scar contraction.

Hashimoto et al reported a case of FCE secondary to multiple evanescent white dot syndrome and postulated that choroidal inflammation can cause RPE and Bruch membrane impairment, leading to the formation of FCE. [8] The presence of hyper-reflective choroidal tissue beneath some FCE lesions on SD-OCT suggests that the scarring of the choroidal connective tissue from previous choroidal inflammatory processes pulls the choroid and RPE toward the sclera, forming a depression. Conversely, Kovacs et al recently reported a case of FCE with adjacent CNV where there was an increase in the size and depth of FCE after anti-VEGF therapy in the absence of acute inflammation. [9] They hypothesized that the collapse of the CNV, including regression of some sub-RPE components,

during anti-VEGF treatment provided a pressure gradient that drove the outward retinal herniation. In the present case, the two OCT findings seemed to be important in the pathogenesis of FCE. The first was the steep regression of the peaked PED, indicating that the polypoidal lesions regressed after years by frequent anti-VEGF therapy. The second was the subsequent attenuation of the inner choroidal layer (choriocapillaries and Sattler's layer) associated with PED regression. SD-OCT findings showed that an area equivalent to the inner layer of the choroid around the PED gradually got shrunken as the PED decreased. In addition, the fact that the choroidal thickness at sites away from the PED did not change during this period indicates that the choroidal changes occurred just in the vicinity of the FCE. During the active phase of PCV, abundant blood flow may support the PL and surrounding vascular network. A large randomized clinical trial demonstrated that one-third of the patients treated with aflibercept monotherapy had complete PL regression at week 96.[10] In our case, repeated intravitreal injections may have caused regression of the PL and a decrease in the blood flow in the surrounding vascular network, resulting in a decrease in the thickness of the inner choroidal layer around the PED, which eventually led to the depression of the choroid. Subsequently, the sensory retina was pulled backward to compensate for this, leading to the formation of FCE.

Conclusion

The treatment-induced volume loss of the inner choroidal layer may be responsible for the development of FCE in PCV when treated with multiple anti-VEGF injections.

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Clarity Unveiled: Contact lens rehabilitation in a Case of Pellucid Marginal Degeneration

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Abstract

Pellucid Marginal Degeneration (PMD) is a progressive, non-inflammatory ectatic disorder of the cornea characterized by inferior peripheral corneal thinning and irregular astigmatism. The disease affects adults in 3rd decade of life, more common in women.[1] Spectacles often fail to provide adequate vision correction due to high irregular astigmatism and contact lens fitting is challenging when compared to keratoconus due to inadequate peripheral support. Scleral lenses often provide good visual rehabilitation owing to their size and conformity of the lens over the cornea.[5] Conventional Rigid gas permeable lenses provide a low cost alternative to scleral lenses provided a good fit.[5] This brief clinical report aims to enumerate the procedure in choosing the base curve,diameter of conventional rigid lens in a case of PMD in achieving good visual rehabilitation.

Case Report

A 36-year-old female presented with complaints of blurring of vision in both eyes associated with headache. She had a history of spectacle use for the past 10 years but was not satisfied with her vision correction. No history of itching and eye rubbing.

The BCVA with spectacles was 6/60 in both eyes (Table 1)

UCVA	CF at 3m	CF at 1m
Subjective Refraction	+2DS/-4.5DC @80°	+2 DS / -3.0 DC @100°
BCVA	6/60	6/60

Table 1: UCVA,BCVA with spectacles of the patient

On Slit lamp Examination, corneal ectasia with thinning was noted in the inferior peripheral cornea with a deep anterior chamber. Rest of the anterior segment was within normal limits. Fundus examination and Intraocular pressure was normal.

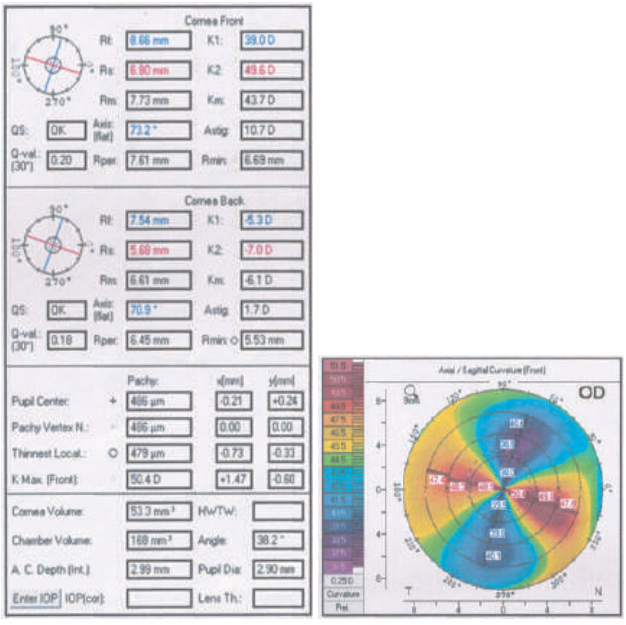

Figure 1: PENTACAM corneal topography of Right Eye (OD)

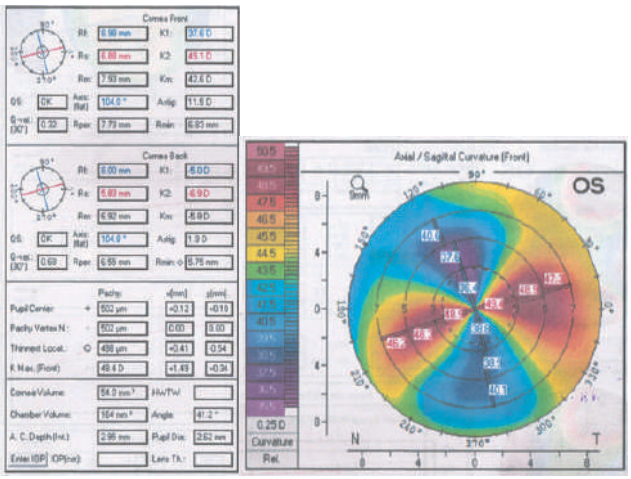

Figure 2: PENTACAM corneal topography of Left Eye (OS)

Parameter	Right Eye	Left Eye
Keratometry	K1:39.0D(8.66mm) K2:49.6D(6.80mm)@163.2deg Astigmatism:10.7D	K1:37.6D(8.98mm) K2:49.1D(6.88mm)@14deg Astigmatism:11.5 D
Pachymetry	479 µm	498 µm

Table 2: PENTACAM corneal parameters in patient with Pellucid marginal Degeneration.

Methods:

After topographic evaluation of cornea by PENTACAM(OCULUS, WETZLAR,GERMANY),{figure 1,2}the clinical diagnosis of Pellucid marginal degeneration was confirmed based on the pattern of corneal elevation,thinning and Lobster claw appearance of anterior corneal surface. The keratometry readings of

anterior corneal surface in mm were recorded and an average of the values was calculated, and used to calculate the base optic zone radius (BOZR)/Base curve(BC) for RGP lens fitting.

Contact Lens Fitting:

Right Eye:

The BOZR was calculated to be 7.9mm by calculating the average of steep K(6.80mm) and flat K (8.60mm). The resultant contact lens calculated with a BOZR of 7.9 mm with a diameter of 8.70mm resulted in a flat fit, characterized by excessive lens movement, and possibility of a loss of lens. Hence, the BOZR was steepened by 0.9 mm to 7.00mm in view of excessive movement and loose fit of the previous trial. Then, further optimization was done in steps of 0.2 mm till 6.8mm and later refined by 0.1 mm to 6.70mm, till a good fit with optimum movement with blink was obtained. The final fit of the trial lens with BOZR 6.70mm ,diameter of 8.60mm with a power of -5.25 D was slightly inferiorly decentered but fitting well on the visual axis.(Figure 3)

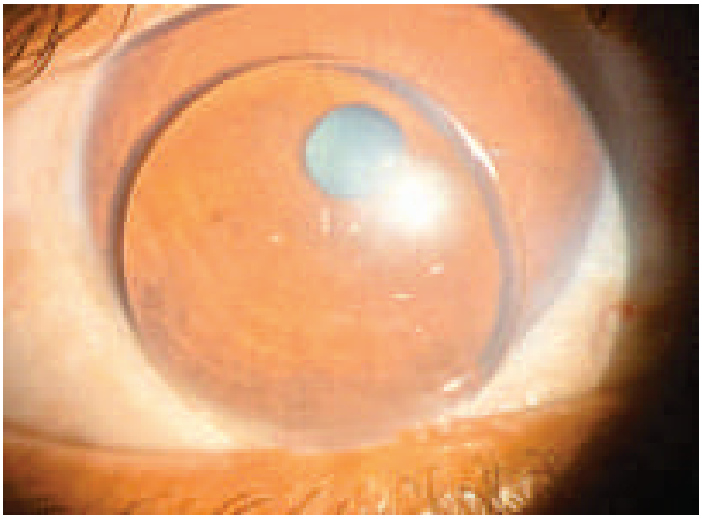

Figure 3: RGP lens fitted in Right Eye with PMD.

Left Eye:

Similarly, for the left eye, BOZR was calculated to be 8.1mm by calculating the average of steep K(6.88mm) and flat K (8.98mm) which produced a relatively flat fit with excessive movement.Hence,the BOZR was steepened by 0.2 mm to 7.9mm followed by further steepening till 6.9mm till an optimal alignment fit with good comfort and stability was obtained.The final fit of the trial lens with BOZR of 6.9mm ,diameter 8.80mm with a power of -4.75 D was found to have a similar pattern as in the right eye with mild inferior decentration and fitting well on visual axis.(Figure 4)

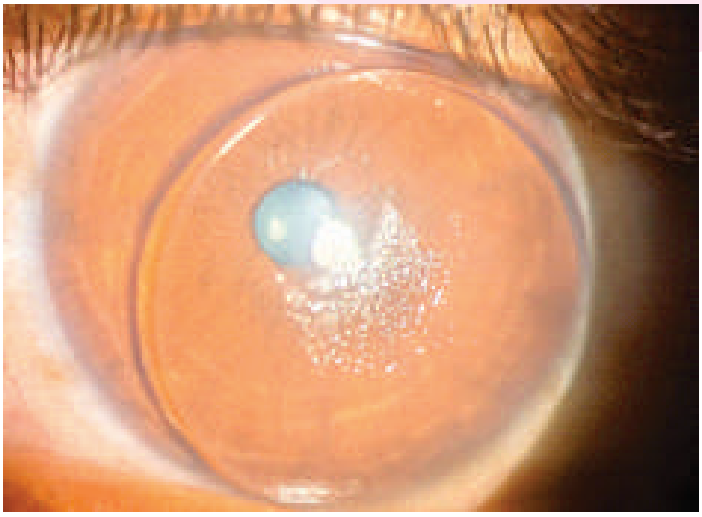

Figure 4: RGP lens fitted in the left eye with PMD

An over refraction was done by dry retinoscopy and a subjective correction was given.

An over add of -2.5DSph in both eyes gave BCVA of 6/6.

RGP lens parameters:

UCVA	CF at 3m	CF at 1m
Subjective Refraction	+2DS/-4.5DC @80°	+2 DS / -3.0 DC @100°
BCVA	6/60	6/60
RGP lens	BOZR 6.7mm DIA 8.60 mm Power:-7.00D	BOZR 6.90mm DIA 8.8mm Power:-7.25 D
BCVA with RGP	6/6	6/6

Table 3: Final prescription of RGP lens in the patient

Post-RGP visual outcome:

- Both eyes achieved 6/6 visual acuity.
- Lens fit was acceptable with adequate centration and movement
- Patient reported significant improvement in quality of vision and comfort.

Discussion

PMD is often misdiagnosed as keratoconus due to its presentation of progressive high irregular astigmatism. Spectacle correction is limited in such cases because of the high degree of peripheral corneal distortion. Rigid gas permeable lenses, by creating a smooth anterior refractive surface through the tear film–lens interface, provide excellent visual rehabilitation.

Alternative options include scleral lenses, hybrid lenses, or surgical interventions such as intrastromal corneal ring segments and keratoplasty in advanced cases. However, RGP lenses remain the first-line, cost-effective, and accessible modality for visual correction in moderate PMD cases.

This case highlights the importance of contact lens fitting and the nuances involved in achieving a good

fit.The resultant improvement in vision of 6/6 with RGP lenses is significant when compared to BCVA of 6/60 with spectacles. The case also explains the need for patient counselling for contact lens in case of high irregular astigmatism.

Conclusion

RGP lenses provide excellent and cost effective visual rehabilitation in PMD patients. The elaborate efforts in achieving an optimium fit provides a good quality of vision with good comfort.Patient couselling and a good after care of contact lens fit help in achieving a satisfactory visual outcome in these challenging cases.

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Tumour Mimicker : Unmasking The Hidden Simplicity

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Introduction

Tumour Mimicker usually refers to tumours whose symptoms or signs mimic other ocular and periocular diseases leading to delayed or incorrect diagnosis. Sebaceous gland carcinoma is a tumour which commonly masquerades as chronic blepharitis, chalazion or conjunctivitis and hence any of these conditions could be thought to be sebaceous carcinoma(1) Due to the invasive potential of sebaceous carcinoma and its masquerading ability, all suspicious ocular lesions should be sent for histopathology. (2) There is also a tendency to over diagnose sebaceous carcinoma in fear of missing the diagnosis of a potentially lethal condition. We present a case of one such tumour mimicker where a benign ocular condition was diagnosed as sebaceous carcinoma and planned for wide excision and reconstruction. Meticulous clinical evaluation and characteristic features of the lesion helped make an accurate diagnosis and avoid significant surgical and mental trauma to the patient.

Methods

An 83 year female presented with complaints of growth in right lower lid which was painless, gradually progressive for 2 months. (Fig 1) She was diagnosed to have sebaceous gland carcinoma and advised wide excision and reconstruction and possibility of multiple surgeries and need for systemic evaluation for malignancy. Patient came for second opinion.

On detailed clinical examination, a non-tender lesion was noted in medial 1/3 of right lower lid, medial to the punctum. Swelling was cystic in consistency. The lesion was located in the region of lacus lacrimalis with normal eyelid lateral to the lesion. Complete punctual stenosis was noted. Rest of lower eyelid had normal architecture, normal lid margin and intact eyelashes.(Fig 2) Examination of the conjunctival side was unremarkable. Syringing through the upper punctum was patent. Left eye was normal.

A diagnosis of Chronic Canaliculitis was made. Patient underwent a 3 Snip Punctoplasty with canaliculotomy under local anesthesia. Intraoperatively, a mixture of purulent material and casts was noted and complete evacuation of secretions was done (Fig 3). Curette was also used to remove all the casts from the canaliculus. Canaliculus was noted to be dilated, about 1.5 cm in width. (Fig 4) Canaliculus was flushed with saline and antibiotic irrigation done. Syringing was patent at the end of the procedure. Sample was sent for gram stain, aerobic, anerobic culture which showed gram positive cocci with mixed staphylococcus and actinomyces infection. Patient was given oral Augmentin and Metronidazole for 5 days with Tab Aceclofenac-

Serratiopeptidase and topical medications including antibiotic-steroid drops, lubricants and chloramphenicol ointment and made a full recovery. Normal anatomy was restored with patent lacrimal system. (Fig 5)

Discussion:

Canaliculitis is inflammation of lacrimal canaliculus which is uncommon and frequently misdiagnosed (3). Sebaceous gland carcinoma is one of the most common malignancy of eyelid comprising 5% of all malignant tumours of eyelid (4) It often mimics benign conditions and if left untreated or inadequately excised can lead to significant morbidity and even mortality with a 5-year survival rate of 75% (5). This leads to overdiagnosis of sebaceous carcinoma in an effort to treat patients effectively.

SGC can present as a nodule in the eyelid which is rapidly progressive. (6) The short duration of symptoms of 2 months in our patient and a large lesion with stretched eyelid might have led towards the diagnosis of SGC. The lesion was present in region of lacus lacrimalis which is usually devoid of lashes (7) might have been confused for absence of lashes and meibomian openings associated with SGC. Absence of discharge or pain (typically seen in canaliculitis) and closure of punctum leading to its obscuration were

further confounding factors which lead to diagnosis of SGC.

Other features of Sebaceous carcinoma include madarosis, destruction of lid margin, forniceal shrinkage, telangiectasia, firm lesion, sometimes presence of chronic blepharoconjunctivitis, (8) none of which were found in our case. One would expect these features in such a large lesion present for 2 months.

The typical features of discharge, pouting punctum and pain associated with canaliculitis (9) were absent in our case. Punctum was completely stenosed due to age which prevented any external discharge. Possibly the infection was self-limiting which explains the lack of pain in a progressive lesion in a closed space. Because the punctum was closed, there was no outlet for the secretions and casts which got sequestered expanding the canaliculus and causing the stretching of the lid.

Careful examination revealed the junction of lateral 2/3 and medial 1/3 of the lid to be intact, where the lashes usually end and all the lashes and meibomian gland openings immediately adjacent to the lesion were anatomically normal without telangiectasia which points against SGC. Conjunctival examination was also normal without the slightest hint of pathology which can be expected in a lesion of this size in case of SGC. (10)

Additionally, the lesion was cystic on palpation with smooth surface and well-defined margins with absence of any cauliflower growth or ulceration or nodularity which ruled out sebaceous carcinoma and favoured a diagnosis of chronic canaliculitis.

Romero et al described a case of painless canaliculitis with slight purulent discharge caused by Gemella hemolysans. (11) Lokdarshi et al described a case of painless swelling in right lower lid, present for 2 months, treated as canaliculitis, pain and redness at presentation resolved with medications, but with a clear cystic lesion on the conjunctival side. There was absence of pus or exudates on marsupialisation leading to a diagnosis of canaliculops or canaliculocoele which is an ectasia of the canalicular wall. On opening the cyst, cut end of canalicular wall was visible. (12) However, our case had dilatation of canaliculus with intact walls ruling out a canaliculocoele.

Our case had no canalicular stenosis or watering at 2 months post op follow up indicating an intact canalicular wall without any inflammatory or iatrogenic damage.

Conclusion:

Sebaceous carcinoma is the most common malignancy in females in 5-6th decade and can be over diagnosed in the fear of underdiagnosis. But absence of typical features must give a benefit of doubt to the patient instead of making a diagnosis of cancer which causes significant mental trauma to patients and their family. A small incision biopsy can be planned in cases of doubt instead of large excisions and reconstructions. Canaliculitis can also present atypically and must be included in the differential diagnosis of medial lid lesions near the canaliculus. Incidence of canaliculitis is ~ 2% of all patients visiting the OPD (13) while the incidence of eyelid tumours as a whole is ~0.9- 0.12%. (14). As the saying goes, uncommon presentations of common conditions are more common than common presentations of more uncommon diseases. Evaluating contributing and opposing factors for a particular diagnosis with a microscopic view can prevent gross misdiagnosis and save unnecessary debilitating surgeries for the patient.

Limitations of The Case:

One of the limitations of above case would be lack of histopathology. HPE of the canalicular wall would have completed the overall diagnosis and definitively proven the original clinical diagnosis of sebaceous carcinoma and was not done.

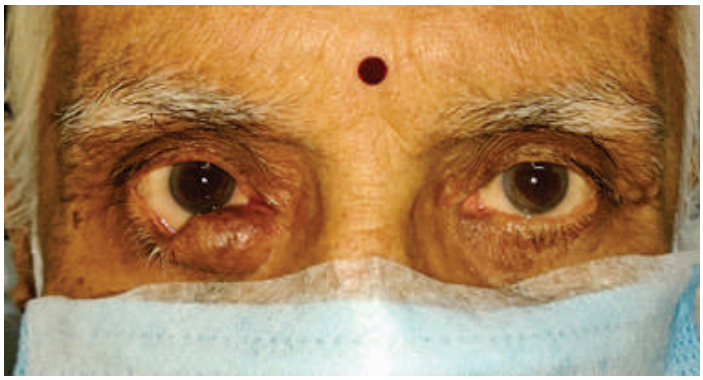

Fig 1 : Anterior segment examination showing lesion in medial 1/3 of right lower lid

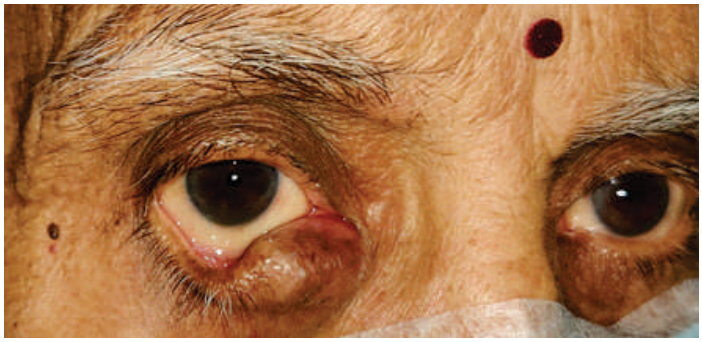

Fig 2 : shows lesion medial to punctum, normal eyelid architecture, intact lashes, no surface infiltration of suspected tumour, stenosed punctum.

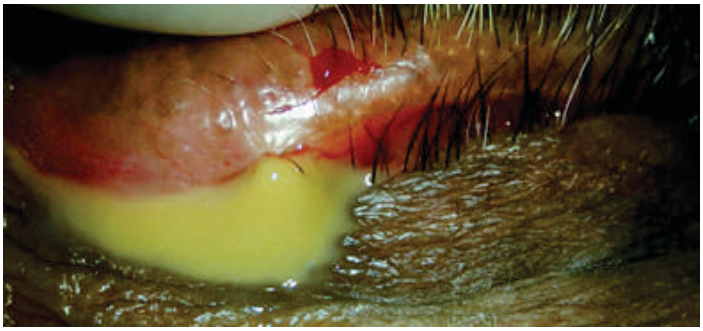

Fig 3 :Purulent material after punctal dilation

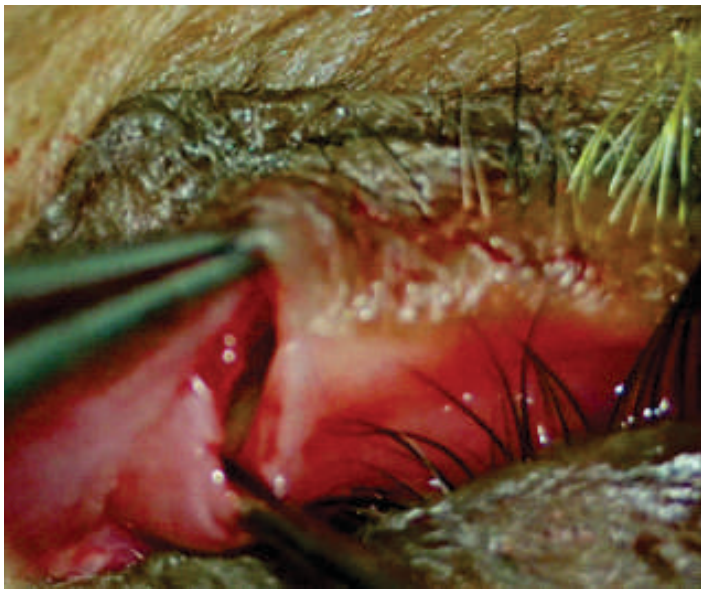

Fig 4: Dilated canaliculus

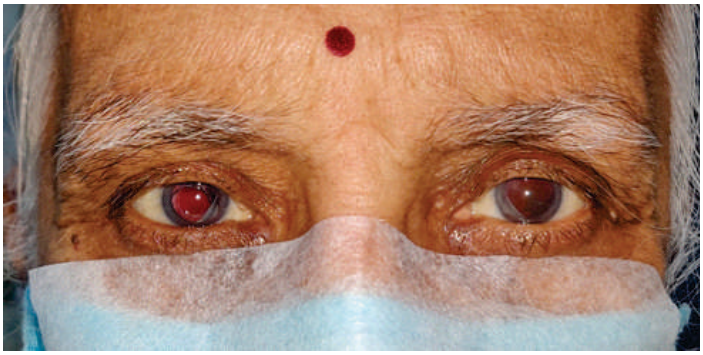

Fig 5 : Right eye normal in anatomy and function

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A Moon in the Chamber: Mid-Zonal Iris Pigment Epithelial Cyst

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The discovery of a pigmented iris lesion often presents a diagnostic challenge, demanding a meticulous clinical examination to differentiate benign entities from potentially malignant masqueraders.

Iris cysts are categorized as primary (congenital) or secondary (acquired).[1] Primary cysts, arising from the iris pigment epithelium (IPE), are most common and are classified by their location.[2]

- **Mid-zonal IPE cysts** are smooth, globular cysts located in the mid-periphery of the iris. They are typically benign and asymptomatic, often discovered during routine eye exams.
- **Pupillary cysts** (or iridociliary cysts) are found at the pupillary margin.
- **Peripheral cysts** (or iridociliary cysts) are located at the far edge of the iris, sometimes hidden behind the sclera, and can occasionally lead to glaucoma.

The midzonal IPE cysts were located most often inferotemporally (51.4%) and second most often temporally (23.0%).[3]

This photo essay showcases a primary, midzonal IPE cyst in a 52-year-old male, identified incidentally during a routine cataract evaluation. The images demonstrate the power of varied slit-lamp illumination techniques in characterizing anterior segment structures. The images were taken by Slit lamp photography with one image being slit beam (fig 1) and another image being in retoillumination technique (fig 2) characterising anterior segment structures
A rarer form, primary iris stromal cysts, develops within the iris's supportive tissue and can be more problematic. While most iris cysts are benign, they require monitoring as they can sometimes enlarge and cause visual disturbances or secondary glaucoma.[2]

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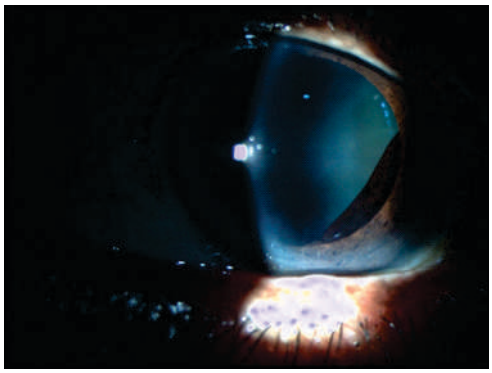

Figure 1:
Slit-lamp photograph using a narrow, bright slit beam. The optical section confirms the inferotemporal greyish pigmented cystic lesion

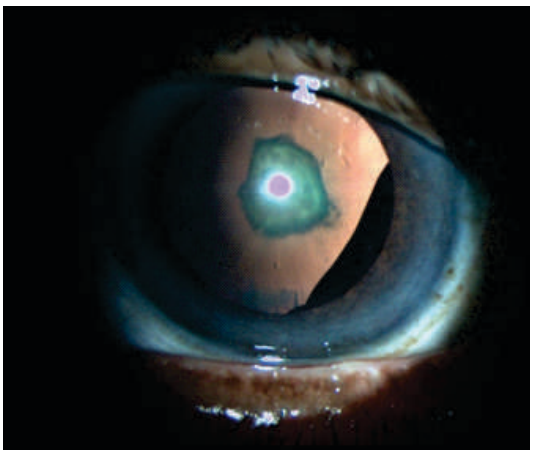

Figure 2:
A slit-lamp photograph using broad-beam tangential illumination and retroillumination. The cyst appears as a sharply demarcated, translucent sphere with presence of subcapsular cataract

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The cobweb cataract!

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Case report:

A 21-year-old gentleman presented with diminution vision in his left eye and an alleged history of accidental nail trauma while hammering; his best corrected visual acuity was 6/36. The slit-lamp examination of the left eye revealed the presence of anterior capsular cataract and traumatic posterior capsular cataract [Fig. a and b], which resembled a spider cobweb over retroillumination [Fig. c]. The treatment strategy included the administration of topical antibiotics and steroids with cycloplegic, with the extraction of the cataractous lens scheduled for the future after confirming of no intraocular foreign body (IOFB) in Computed tomography (CT). Traumatic cataracts caused by trauma can develop immediately or months to years later.[1] The cobweb-like pattern traumatic cataract is characterized by delicate web-like opacities primarily in the anterior subcapsular and seldom posterior subcapsular region, whereas other traumatic cataract morphologies—such as rosette, membranous, or white soft types—exhibit distinctly different structural patterns like star shapes, total opacification, or loose cortical material depending on the nature and location of trauma.[2] Typically, rapid cataract formation results from lens capsule rupture with aqueous humour seepage into lens fibres. If there is no rupture of the capsule, it is believed that the traumatic forces injure lens fibres, culminating in the formation of a cataract.[3] Approximately 27-65% of ocular traumas result in traumatic cataracts.[4] The cobweb pattern traumatic cataract typically indicates localized anterior subcapsular and seldom posterior subcapsular damage, which may facilitate easier cataract extraction due to limited zonular or capsular compromise.[5] This morphology generally does not adversely affect surgical outcomes compared to other complex traumatic cataracts, provided there are no associated intraocular injuries.[6]

Keywords: Anterior capsular cataract, Cobweb cataract, Posterior capsular cataract, Traumatic cataract.

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Declaration of patient consent:

We certify that we have obtained all appropriate patient consent forms. In the form, the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Financial support and sponsorship: Nil.
Conflicts of interest: There are no conflicts of interest.

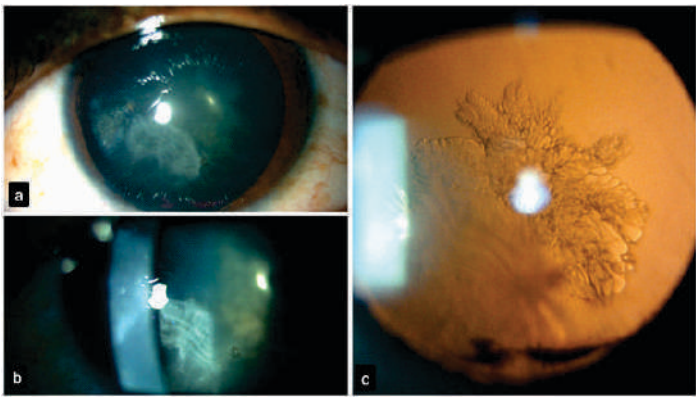

Figure a and b: Slit-lamp examination of the left eye revealed the presence of anterior capsular cataract and traumatic posterior capsular cataract.

Figure c: Resembled a spider cobweb over retroillumination.

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Honey Comb Epitheliopathy – Not with ROCK but with ICE

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Abstract

This photo essay documents an unusual presentation of honeycomb epitheliopathy in a patient with iridocorneal endothelial (ICE) syndrome, demonstrating that this distinctive corneal edema pattern classically linked to Rho-kinase (ROCK) inhibitors can arise from primary endothelial dysfunction. The pathognomonic reticular "honeycomb" epithelial pattern, diffuse corneal edema, and specular microscopy findings of endothelial failure, all in the absence of ROCK inhibitor exposure are highlighted. Unlike drug-induced cases, this condition requires surgical intervention, underscoring the importance of distinguishing between reversible and irreversible etiologies of corneal decompensation. The visual narrative emphasizes key diagnostic features of ICE syndrome while challenging the assumption that honeycomb epitheliopathy is exclusively pharmacologic.

Keywords

Honeycomb epitheliopathy, ROCK inhibitors, ICE syndrome, corneal decompensation

Introduction

A 56-year-old female presented with unilateral, subacute blurring of vision, photophobia, pricking sensation, and intermittent redness in the left eye. Symptoms improved by the end of the day, suggestive of corneal endothelial decompensation. Best-corrected visual acuity was counting fingers at 1 meter. Anterior segment examination revealed edematous cornea with a characteristic reticular pattern, and multiple transparent epithelial cell cysts coalescing into a honeycomb-like appearance, extending limbus to limbus. Superficial and deep Descemet's folds were observed. The iris exhibited multiple atrophic patches with skip areas of peripheral anterior synechiae. Anterior chamber was quiet, and intraocular pressure was 14 mmHg. On gonioscopy, high anterior insertion of iris was noted inferiorly in two quadrants. Specular microscopy showed complete loss of endothelial architecture; cell density was unassessable. Early cataractous changes were noted. Posterior segment was normal. The right eye examination was unremarkable.

Surprisingly, the patient denied ROCK inhibitor use. The unilateral corneal edema, gonioscopic PAS, and specular microscopy findings in a middle-aged female led to the diagnosis of Iridocorneal-endothelial (ICE) syndrome. A triple procedure (Phacoemulsification with IOL and Endothelial keratoplasty) was recommended.

Discussion

Honeycomb-type Reticular Epithelial Corneal Edema (RECE), a feature of corneal decompensation, is often linked to ROCK inhibitors as a 'novel and reversible' side effect.[1,2] ROCK-inhibitor mediated disruption of actomyosin contractility, cell adhesion, and cytoskeletal dynamics in epithelial cells has been postulated as a possible mechanism of RECE.[1] This case, however, demonstrates RECE without prior pharmacological exposure to the same.

In ICE syndrome, endothelial failure is known to cause corneal fluid influx and epithelial junction disruption, producing the observed reticular edema.[3,4] Typically, epithelial edema in ICE manifests as diffuse or microcystic changes, occasionally forming epithelial bullae that begin inferiorly and progress centrally with worsening endothelial dysfunction.[4] The uniform, reticular “honeycomb” pattern seen in our patient is therefore atypical and suggests that primary endothelial compromise alone can mimic the pharmacologic pattern described with ROCK inhibitors. We postulate that the disease entity itself, rather than a pharmacological trigger, underlies the epitheliopathy here.

This case highlights possible non-pharmacological causes of honeycomb epitheliopathy, particularly in endothelial dysfunction syndromes like ICE. Unlike ROCK inhibitor-induced epitheliopathy, which resolves with drug cessation, these require definitive treatment.[5]

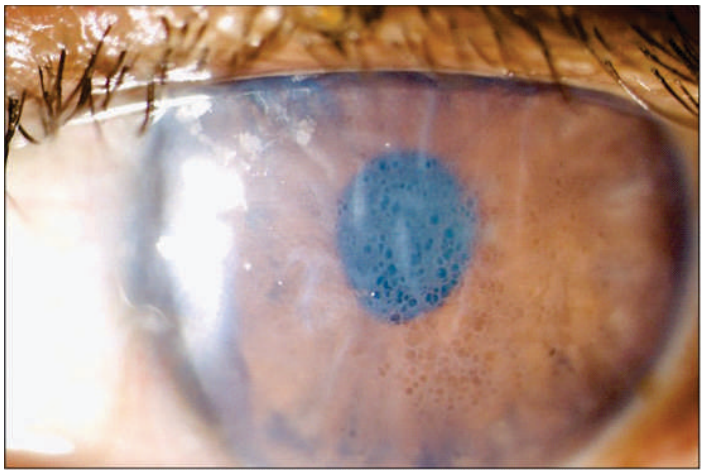

Figure 1: Diffuse slit-lamp photograph showing honeycomb reticular epitheliopathy

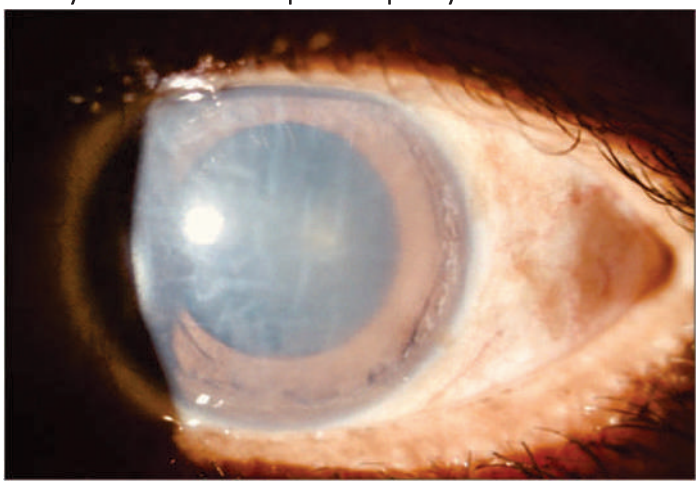

Figure 2: Diffuse slit-lamp photograph showing descemet's folds, multiple sectoral peripheral anterior synechaie (PAS), with associated iris atrophy

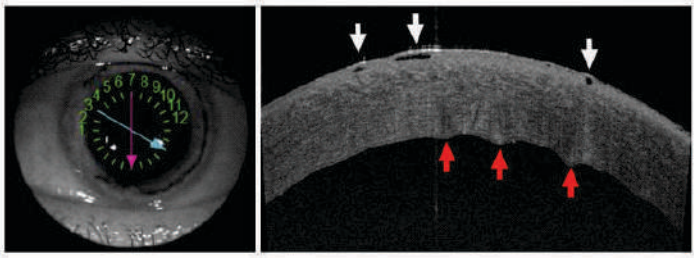

Figure 3: Anterior segment Optical Coherence Tomography (SD-OCT) in central 5 mm optic zone showing multiple cystic spaces in epithelium (white arrows), suggestive of reticular epithelial edema and multiple endothelial excrescences (red arrows).

Declaration of Patient Consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given consent for clinical information and images to be reported in the journal. The patient understands that names and initials will not be published, and due efforts will be made to conceal identity, but anonymity cannot be guaranteed.

Financial Disclosure

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Conflicts of Interest

The authors declare no conflicts of interest related to this publication.

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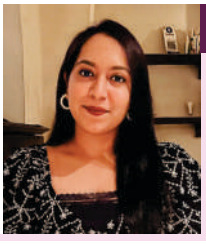

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A Roadmap for acquiring surgical skills for postgraduate students: A perspective

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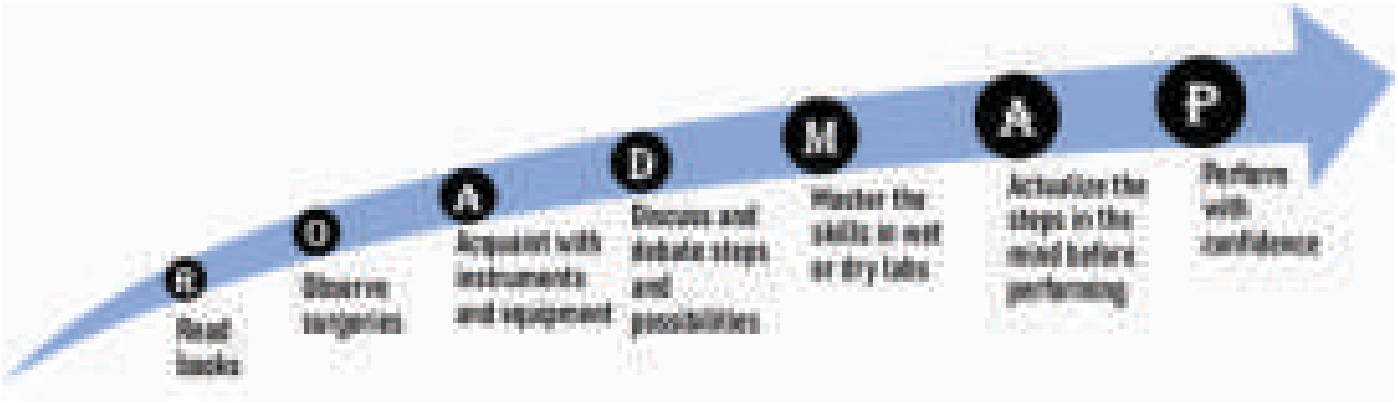
Surgical training is an essential component of postgraduate training in ophthalmology. A passed-out student is externally assessed by the marks obtained in the theory and practical examination, but is internally assessed by the number of surgeries performed during residency. The National Medical Commission has provided guidelines that a student must be able to "competently handle and execute safely all routine surgical procedures" by the end of residency.[1] A study in Europe has included skill transfer as one of the core criteria for residency training and recommended 86 cataract surgeries during residency training.[2] However, surgical training and exposure are not uniform across institutions. In a study among residents in South India, nearly 40% of the students were not satisfied with the surgical training in their centres.[3] Within disparities and constraints, every resident in ophthalmology must be proactive in learning the common ophthalmic surgeries to the best possible extent. Here is a useful roadmap for acquiring surgical skills for learners.



Read: Reading ophthalmic anatomy is a crucial starting point for learning surgeries. How would one correctly place a simple superior rectus bridle suture without understanding where and how the muscle is inserted? How would one do lacrimal probing without knowing the orientation of the nasolacrimal duct? Only a thorough reading and understanding of surgical anatomy and steps will initiate surgical training. Of the many books on surgeries, one book every ocular surgeon would recommend is Steinert's Cataract Surgery.[4] The diagrammatic representations, legends, and detailed descriptions are akin to storytelling and take the learner through a surgical journey. Although reading from hard copies is a pleasurable task, the modern generations may choose e-copies of the textbooks. Whatever the source, reading is an irreplaceable step in learning and must be repeated several times for continued learning.

Observe: Observation is a skill that provides a lasting visual memory, but is often underutilised by learners. "How a surgeon smoothly navigates a curved needle through tissues; how instruments are manoeuvred using wrist movements; how operating microscope is focused differently for corneal incision and for anterior capsulotomy; how tissues are gently but firmly grasped, how different surgeons use different techniques for the same step;" every observation is valuable. Observing a live surgery in the theatre provides a second-by-second panoramic view. All a student needs to do is 'mindfully observe', think, analyse, understand the dos and don'ts, and ask questions. OT observation forms a component of a structured surgical training of residents to improve safe and effective skill transfer.[5] It supplements reading by filling the hazy gaps in understanding. Learners may observe surgeries using assistant scope of the microscope or LED/TV screens in the OT, or even surgical videos which are widely available. When groomed with an active, inquisitive and analytical mind, observation can be a rich source of learning.

Acquaint: Acquainting oneself with all aspects of surgical instruments and equipment is a pivotal step preceding their use. Ocular surgery involves specifically designed, delicate instruments, sophisticated operating microscopes, and foot-pedal controls. "How would one appropriately work on the

foot pedal of the phaco-machine without getting accustomed with the step positions and the thrust needed to shift them." A learner must read the user manuals and never miss a demonstration by an expert. Similarly, acquainting with instruments helps learners choose and use the right instruments in the right manner, including the correct methods of sterilization. Why are some instruments autoclaved and some ETO sterilized? When to use absorbable and non-absorbable suture, cutting needles and round-bodied needles? Surgical instruments like choppers, keratome blades, trabeculectomy punches, Bowman's probes, sutures and needles are available in different sizes and designs. A learner must leisurely examine the instruments, read the product descriptions, understand the nuances and be acquainted with the comprehensive know-how of the instruments and equipment. This will provide the necessary knowledge-armour to the surgeon-soldier, before entering the OT-field.

Discuss and debate: As a next step, discussions and debates with teachers or other learners can deepen learning. A debriefing after observing a surgery or after performing one, would illuminate many issues. "Why did the capsulotomy edge run away? How did the surgeon effectively avoid an Argentinian flag sign? Why did an unexpected surge occur? How did the surgeon manage the floppy iris? Why did the surgeon change the plan of surgery?". A lot can be learnt by discussing on-table complications and reflecting on their prevention and management. A healthy debate on what went right or wrong and an in-depth dissection of each step, complication and outcome would help acquire invaluable practical surgical skills. This learning could bring relief to a surgeon in critical moments in the future.

Master it: While surgical training has evolved over time, mastering surgical skills is possible today even before actually operating on a patient's eye. Wet-lab, dry lab and simulator-based training can hone skills like precision, surgical dexterity, depth perception, hand-eye and hand-foot-eye coordination. Such hands-on practice sessions can help shorten the learning curves, with good surgical outcomes without risks to the patients.[6] Vegetables can be used to practice trabeculectomy steps.[7] Residents can master surgical dexterity by training the nondominant hand during daily living activities such as brushing their teeth.[8] Learners must take advantage of such simple methods when advanced simulators are not available. The use of step-by-step Gibb's Structured Debriefing is a useful method of reflective learning.[9]

Actualize: With actualization, the author means a dry run through a meditative mind-tour of the surgical steps before actually performing it. The learner spends a few solo moments in quietude just before operating and visualizes the whole surgery step-by-step behind closed eyelids. The brain takes the lead and orchestrates the surgery as if it were actually happening in real time. *"Last time, the scleral tunnel was too deep, leading to a premature entry- this time, I must be cautious and get the right scleral depth. At the same time, my crescent must not be too superficial to give rise to button-holing of the sclera"*. This reinforces the minute elements of surgery and allows a good dry run of the whole procedure. It enhances preparedness before performing surgery, builds up confidence, strengthens focus, reflects on past difficulties, and improves performance. For a small incision cataract surgery, the two most critical steps I often try to mentally actualize before every case are "good tunnel" and "good capsulotomy". Immersion is the name of the game. Such reflective learning helps enhance surgical skills as per the criteria set by the Ophthalmology Surgical Competency Assessment Rubrics.[10]

Perform: When the opportunity to operate comes, the learner must transform into a confident resident by setting aside all worries and distractions, and handing over all other responsibilities. A learner must carry positivity and do the best to enhance the performance. Speaking to the patient, nurse or optometrist, peers, and seniors prepares one better. Discussing possible difficult steps for the given case helps. Along with the mask, cap, scrubs and gloves, the resident must be equipped with all the knowledge and skills mastered so far. Starting the surgery with positive vibes helps. While operating, the resident must recognize any limitation or complication, identify when to request help and when to hand over the reins to a senior. Here is the importance of being truthful and honest. It is important to feel confident, yet not be overconfident, casual or careless. Depending on the level of learning, the resident must perform and graduate from simple basic steps to more complicated ones, from simple straight-forward cases to more complicated ones. Journaling and notes after each surgery can be precious for life-long reflective learning.

Conclusion: Surgical skills are not acquired overnight. Residents need to focus their energies and immerse themselves in learning by reading, observing, acquainting themselves with the equipment and instruments, discussing and debating choices,

mastering surgical skills, actualising in the mind, and finally performing. Residents can benefit by navigating the R.O.A.D.M.A.P. to become confident surgeons.

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The "See-Saw" Method: A Balanced Push-and-Pull Technique for Managing Penetrating Ocular Fish Hook Injuries

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Abstract
Purpose: To report the successful management of a complex penetrating ocular injury caused by a barbed fish hook using a novel "See-Saw" removal technique combined with vitreoretinal surgery.
Methods: A case study of a young male who presented with a fish hook perforating his upper eyelid and penetrating the globe. The surgical management involved advancing the hook inward toward the eye to disengage the barb, followed by controlled removal. The subsequent globe rupture was managed with scleral tear repair, a pars plana vitrectomy to address vitreous hemorrhage and incarceration, and barrage laser photocoagulation to seal a retinal break.
Results: The combined surgical approach resulted in the complete and safe removal of the foreign body, successful anatomical repair of the globe. The retina remained attached at follow-up.
Conclusion: The "See-Saw" method, a balanced push-and-pull technique, can be a valuable strategy for minimizing tissue trauma during the removal of barbed intraocular fish hooks. When combined with immediate and comprehensive vitreoretinal repair, it can lead to excellent functional and anatomical outcomes.
Key words: Fish Hook, Vitrectomy, See Saw

Introduction

Fish hook injuries to the eye, while uncommon, represent a serious form of ocular trauma that can lead to permanent vision loss [1]. The presence of a barb on the hook is the primary complicating factor, as it resists simple retraction and can cause extensive secondary damage to delicate ocular structures during removal. Several techniques have been described for extraocular injuries, including the "advance and cut" and needle-cover methods [2, 3]. However, managing intraocular penetration requires a more sophisticated approach. We describe a case of a penetrating globe injury from a fish hook, which was successfully managed by advancing the hook to disengage the barb, followed by complete vitreoretinal repair

Case Presentation

A young male patient presented with a history of a fish hook accident that occurred while he was fishing. The hook was embedded in his left upper eyelid and had penetrated the eyeball (Figure 1). On examination, the hook was noted to be a single, barbed hook. Visual acuity was hand movements due to the injury and associated vitreous hemorrhage. A CT scan confirmed the presence of an intraocular metallic foreign body, demonstrating penetration through the sclera. The patient was immediately prepared for emergency surgical intervention.

Surgical Management

The patient was placed under local anesthesia. The surgical plan consisted of two main stages: removal of the hook and repair of the intraocular damage.

1. The "See-Saw" Removal Technique: A standard "advance and cut" technique was deemed too traumatic. Instead, a balanced push-and-pull approach was utilized. The hook's entry point was stabilized. The shank was then carefully pushed further into the eye along its natural curve, just enough to see the barb from the scleral tissue. This controlled push, followed by a guided pull, minimized the need to enlarge the scleral wound for extraction. Once the barb was free, the hook was gently backed out through the entry wound and entry wound in lid was repaired with 8.0 Vicryl suture (Figure 2).
2. Globe and Retinal Repair: The scleral entry wound was identified and repaired using 8-0 vicryl sutures. A standard three-port pars plana vitrectomy was then performed. Vitreous hemorrhage was cleared, revealing a retinal break at the impact site.
   The retinal break was surrounded with barrage laser photocoagulation to create a firm chorioretinal adhesion and prevent subsequent retinal detachment. Intravitreal antibiotics were administered as prophylaxis against endophthalmitis.

Postoperative Course

The postoperative recovery was uneventful. The patient was treated with a course of topical and systemic antibiotics and steroids. The scleral wound healed well, and the retina remained attached. At the final follow-up, the best-corrected visual acuity had improved to 6/6, and there were no signs of long-term complications.

Discussion

Management of intraocular fish hook injuries must be tailored to the specific case, including the hook's size, location, and barb design [4]. Pushing the hook forward to disengage the barb is a known strategy, but it carries the inherent risk of causing further intraocular damage. The "See-Saw" method described here emphasizes controlled, minimal advancement, focusing on balance and finesse rather than force, thereby reducing iatrogenic trauma.

The successful outcome in this case is attributable to a multi-faceted approach. First, the atraumatic removal of the hook prevented the extension of the scleral tear and minimized further vitreoretinal traction. Second, the immediate and thorough vitrectomy removed the scaffold for proliferative vitreoretinopathy and cleared the media for retinal treatment. Finally, the application of laser to the retinal break was critical in preventing a future retinal detachment, a common cause of vision loss after such injuries.

Conclusion

The "See-Saw" method offers a safe and effective modification of existing techniques for removing intraocular barbed fish hooks. This case demonstrates that even in complex penetrating globe injuries, a favorable visual outcome can be achieved with a meticulous surgical approach that combines atraumatic foreign body removal with comprehensive vitreoretinal repair.

Youtube link QR code:

https://www.youtube.com/watch?v=QQ9EVW0qU5U

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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Figure with Legends

Figure 1: Fish hook injury to the left eye through left upper eye lid and then penetrating sclera superotemporally

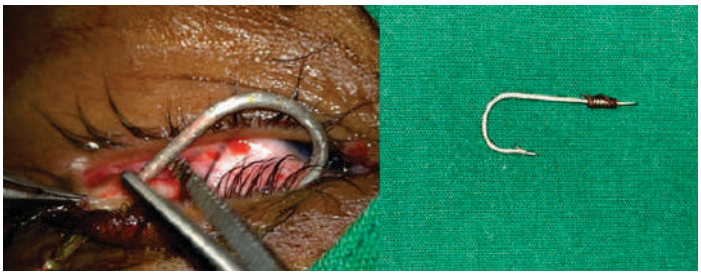

Figure 2: Intraoperative See Saw technique of loosening Fish hook and removed hook

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Pliancy of Plication - Modifications of Plication

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Abstract
Strabismus, or misalignment of the eyes, is a common condition requiring surgical intervention to restore ocular alignment, improve cosmesis, and facilitate binocular vision. Muscle strengthening procedures are a cornerstone of this management. Traditionally, rectus muscle resection has been the standard strengthening technique. In this article, we describe the surgical technique and various modifications aimed at improving cosmetic and functional outcomes of rectus muscle plication. The effectiveness of plication is highlighted by its comparable efficacy to resection in correcting small to moderate-angle deviations, with the significant advantages of preserving the anterior ciliary arteries, reducing the risk of anterior segment ischemia, and offering potential reversibility.

Introduction

Strabismus affects approximately 2-4% of the population, presenting as a manifest deviation of the visual axes [1]. The primary goal of surgical management is to realign the eyes by adjusting the tension and action of the extraocular muscles. Surgical procedures are broadly categorized into two types: weakening procedures (e.g., recession) and strengthening procedures (e.g., resection).

The conventional strengthening procedure is rectus muscle resection, which involves excising a segment of the muscle tendon and reattaching the shortened muscle to its original insertion point on the globe [2]. While effective, resection permanently alters the muscle tissue and necessitates disinsertion, thereby transecting the two anterior ciliary arteries that run within each rectus muscle (except for the lateral rectus, which has one). This carries a small but significant risk of anterior segment ischemia (ASI), particularly when multiple muscles in the same eye are operated on[3].

Rectus muscle plication has emerged as a robust alternative that achieves muscle strengthening without tissue excision or disinsertion[4]. The technique involves folding the muscle upon itself and securing it with sutures at the insertion site. This effectively shortens the muscle's functional length, increasing its mechanical advantage and rotational force. By avoiding disinsertion, plication completely preserves the anterior ciliary arteries, virtually eliminating the risk of ASI and offers the key advantage of potential reversibility[5]. This article provides a detailed description of the surgical technique and modifications of the standard technique, designed to enhance cosmetic outcomes and refine the procedure's efficacy.

Surgical Technique

The procedure described is for a Left medial rectus muscle plication for the correction of exotropia. The principles are applicable to any rectus muscle.

1. Preoperative Assessment and Preparation:

A comprehensive ophthalmic examination is performed, including assessment of visual acuity, cycloplegic refraction, and a detailed evaluation to quantify the angle of deviation at distance and near fixation. The amount of plication is determined based on standard surgical tables, with nomograms like those used for resection[6]

The procedure is most often performed under general anaesthesia, especially in paediatric patients. Following sterile preparation and draping of the surgical field, a lid speculum is inserted to ensure adequate exposure of the globe.

2. Conjunctival Dissection:

A limbal or fornix-based conjunctival peritomy is performed over the muscle to be operated on. For a medial rectus, this is done in the nasal quadrant. The conjunctiva and Tenon's capsule are carefully dissected and retracted to expose the underlying sclera and the insertion of the rectus muscle. Meticulous haemostasis is maintained throughout. (Fig 1A)

3. Isolation of Muscles:

Muscle hooks (e.g., Jameson or Graefe hook) are passed beneath the muscle tendon at its insertion to isolate it from the sclera and surrounding fascial attachments. Intermuscular septae and check ligaments are carefully dissected to ensure the muscle is free, allowing for accurate suture placement and manipulation. (Fig 1B)

A key modification to this step is the concept of Plication MADI (Marginal Dissection of Plicated Muscle). In this approach, rather than a full dissection of the muscle, dissection is limited only to the margins of the muscle segment intended for plication. This further minimizes tissue trauma and preserves more of the muscle's natural fascial planes.

4. Suture Placement:

6-0 Vicryl suture on a spatulated needle is used (Fig 1C). The key steps are:

- Muscle Belly Pass: The desired amount of

plication (e.g., 5 mm) is measured from the centre of the muscle insertion posteriorly using callipers. The needles are passed through the outer thirds of the muscle at this measured point.

➢ Scleral Pass: Each needle is then passed through the superficial sclera at the corresponding corners (superior and inferior) of the original muscle insertion. These passes should be parallel to the limbus and engage the full thickness of the tendon stump at the insertion.

5. Plication (Folding the Muscle):

The two arms of the suture are then drawn taut simultaneously. This action pulls the posterior segment of the muscle forward, folding it over the anterior portion that lies between the suture line and the insertion. This creates a "tuck" or "plication" of muscle tissue directly over the insertion. (Fig 1D)

6. Securing the Plication and Closure: Once the desired tension is achieved, the sutures are tied securely with a surgical knot. The conjunctiva and Tenon's capsule are then repositioned and closed using fine, absorbable sutures (e.g., 6-0 Vicryl). Antibiotic-steroid ointment is applied to the eye.
(Fig 1E)

To address the potential for a cosmetic bump from the folded muscle, an additional flattening suture is passed through the plicated muscle from each side to flatten the muscle and therefore improve cosmesis (Fig 2)[7]

For complex cases or large-angle deviations, a more advanced technique known as Equatorial Repositioning[8] may be employed. This involves a partial plication where the initial anchoring suture is not placed at the insertion but more posteriorly, near the equatorial region of the globe. A second suture then completes the plication by securing the muscle to its original insertion. This technique aims to alter the muscle's arc of contact more significantly, potentially enhancing its strengthening effect.

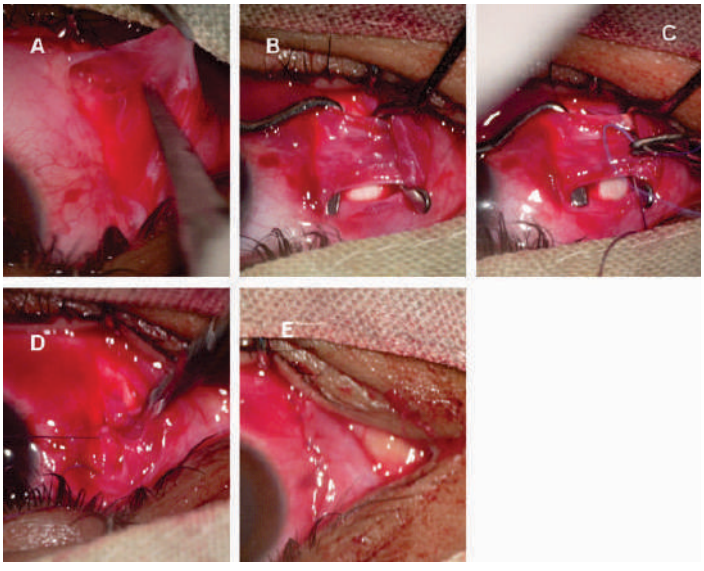

Figure 1: **A:** Conjunctival dissection, **B**: Isolation of Medial rectus, **C**: Suture placement, **D:** Plication of MR

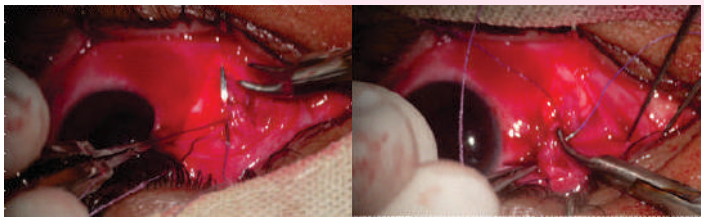

Figure 2: Additional suture passed through the plicated muscle from each side to flatten the muscle

Discussion

The treatment of strabismus is aimed at achieving functional and cosmetic alignment. Rectus muscle plication offers several distinct advantages over the traditional resection technique, making it an increasingly favoured option in modern strabismus surgery.

The most critical advantage is the preservation of the anterior ciliary arteries[5]. By avoiding muscle disinsertion, the entire blood supply to the anterior segment is left intact. While other vessel-sparing techniques can be performed, plication is often considered less surgically challenging to perform with good vascular preservation. This makes plication an exceptionally safe procedure for patients requiring surgery on three or more rectus muscles in the same eye, for reoperations, or for patients with underlying vascular conditions [3].

Second, plication is less invasive and tissue-sparing[9]. No muscle tissue is sacrificed, which may be advantageous for maintaining muscle physiology. It is often associated with less postoperative inflammation and a shorter surgical time compared to resection. This tissue-sparing benefit is further enhanced by modifications like Plication MADI, which limits dissection to only the necessary muscle segments, reducing surgical trauma.

Third, the procedure is potentially reversible. Since the muscle is merely folded, the plication sutures can be cut and removed in the early postoperative period if a significant overcorrection occurs, allowing the muscle to return to its original state more readily than a resected muscle could be advanced [10].

The primary indication for plication is in cases of small to moderate-angle esotropia or exotropia. Its efficacy has been shown to be comparable to resection for similar amounts of surgical correction in multiple randomized controlled trials[11]. It is frequently performed in combination with a recession of the antagonist muscle (e.g. medial rectus plication with recession of the lateral rectus for exotropia). The evolution of the plication procedure with techniques such as the flattening suture, Plication MADI[12], and Equatorial Repositioning demonstrates the versatility of the surgery. These modifications are not standard in

every case but represent thoughtful refinements to address specific challenges.

Despite the low rate of complications, suture-related complications like granuloma formation or slippage could arise. The folded muscle tissue can give the area around the caruncle a bumpy or full appearance. This may be a cosmetic problem for some patients initially, though the bump usually resolves and flattens over several months. The use of the aforementioned additional flattening suture is a specific surgical manoeuvre which can be used to mitigate this issue. As with any strabismus procedure, under- or overcorrection remains the most common complication [13].

Conclusion

Rectus muscle plication represents a significant refinement in the surgical management of strabismus. It is a safe, effective, and reliable strengthening procedure that achieves predictable ocular alignment comparable to traditional resection. Its main advantage-the complete preservation of the anterior segment vasculature-makes it the procedure of choice in high-risk patients and a compelling alternative for routine cases achieving therapeutic goals with minimal disruption to native anatomy and physiology.

However, the choice of procedure should always be tailored to the individual patient's clinical presentation, but rectus muscle plication should be considered a primary surgical option in the armamentarium of every strabismus surgeon.

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Declaration of patient consent

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The novel MIGS for the novice surgeon: A comprehensive guide on how to ace the learning curve

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MIGS – The suave choice in anti-glaucoma management

The glaucoma management spectrum encompasses a myriad of therapeutic options – which includes medical therapy, laser procedures, conventional glaucoma filtration procedures as well as glaucoma drainage devices.[1] A relatively newer addition to this armamentarium is the Minimally Invasive Glaucoma Surgeries (MIGS). MIGS is defined by five characteristics - (a) ab interno microincision, (b) minimal trauma to the angle, (c) good efficacy, (d) high safety profile and (e) rapid recovery.[2]

MIGS is predominantly reserved for patients with mild to moderate glaucoma. It addresses issues related to medical therapy such as costs, compliance and toxicity of preservatives [3], as well as the invasive and lifestyle-altering sequelae of conventional trabeculectomy.[4] MIGS is not one, but rather a group of surgical procedures and devices that target to reduce the intraocular pressure. They are classified into surgeries that (i) increase the trabecular outflow (iStent, iStent Inject, Suture GATT, KDB), (ii) procedures which increase the suprachoroidal outflow (iStent Supra, MINInject) and (iii) procedures involving conjunctival bleb formation (MIGS Plus, Xen, PreserFLo).[5]

An encyclopaedic guide for neophyte surgeons on how to foray into the MIGS odyssey.

Which is the anesthetic route of choice?

Peribulbar or sub-Tenon's block is the preferred modality in case of novice MIGS surgeons as it provides both akinesia as well as anaesthesia. It helps integrate surgical confidence during the learning curve, as it potentially reduces the occurrence of intraocular complications by avoiding inadvertent eye movements seen in topical blocks.

How to prepare the surgical site for optimal visualization and access?

The nasal angle is the target site for most MIGS procedures. (Figure 1)

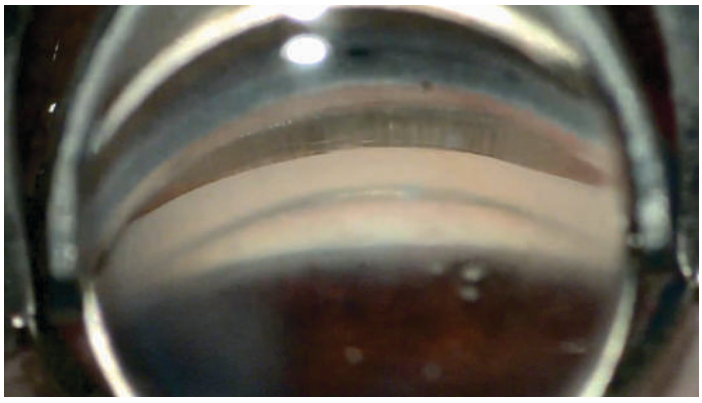

Figure 1

Direct gonioscopic image showing four clock hours of the nasal angle.

This requires a temporal approach for the visualization of the angle. This can be achieved by rotating the head of the patient nasally by 30 to 40 degrees, along with the rotation of the microscope temporally for the same 30 to 40 degrees. This aligns the coaxial light along the iris plane, thereby increasing the magnification of the angle, as well as ensuring optimal illumination to visualize the angle structures. The amount of tilt can be accurately measured by means of various smartphone applications, as well as manual small scales.
(Figure 2)

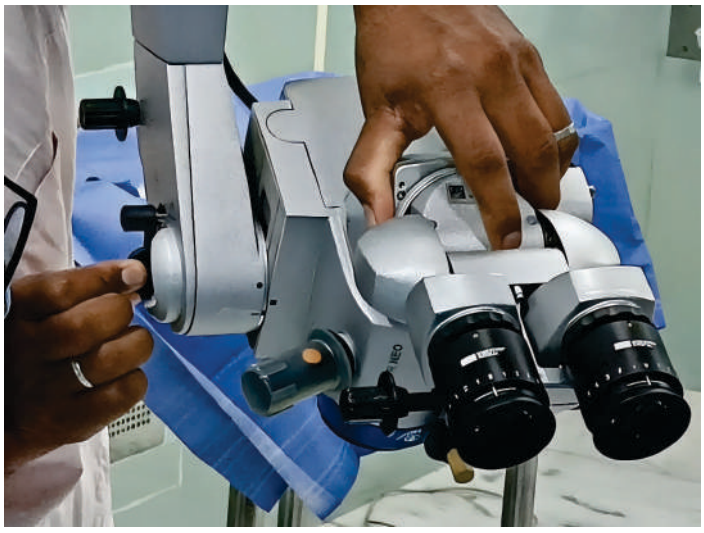

Figure 2

Manual temporal tilt of the microscope by 30 degrees, performed by holding the microscope body and tilting the binocular tubes.

What are the compatible microscopes for MIGS procedures?

Higher-end microscopes, especially those manufactured after the year 2000 have tilt facilities – which may be manual or motorized. The lower-end microscopes with manual step magnification usually do not have a rotating knob. In such cases, it can be tilted by holding the microscope body and tilting the binocular tube, thereby forcing the tilt.

Where to place the corneal incision?

The corneal incision should be made just within the temporal limbus along the 3-9 o'clock axis, which enables equidistant surgical access to superonasal and inferonasal angle structures.

How to choose an appropriate OVD?

The dispersive-cohesive viscoelastic soft-shell technique is the modality of choice for intraocular manipulation during MIGS procedures. It consists of a viscodispersive OVD which protects and coats the endothelium, and a second deeper layer of viscocohesive OVD which maintains space in the angle.[6]

How to perform Direct Gonioscopy?

The core tenet of performing any MIGS procedure, is the optimal visualization of the angle structures by means of direct gonioscopy.

How to choose an appropriate Direct Gonioscope?

Direct gonioscopy involves the use of direct gonioscopes, the most common being Koeppe goniolens, Richardson-Shaffer's goniolens, Huskin Barkan goniolens, Swan Jacob Goniolens, Thorpe goniolens and Layden goniolens.

Recent advances in direct gonioscopes are the iPrism S Gonioprism, iPrism SX Gonioprism, Katena - Hand Held, Katena - Hands Free, Volk Surgical Goniolens, and Ocular Secure Flex HF Surgical Goniolens.

Among these, the most suitable for a novice surgeon are the iPrism SX and the Volk Surgical goniolens. iPrism SX is a single-use gonioprism, with a lightweight handle and expanded incision access. Volk Surgical goniolens is reusable, with a Thorton-Style stabilization ring for precise control of the globe and distortion-free image of the anterior chamber.

How to optimally position the surgeon's hands during the procedure?

The direct goniolens is to be held with the non-dominant hand. To ensure steady fixation of the lens on the eye, rest the palm on the forehead or cheek based on the laterality and arch fingers over the nasal bridge. The dominant hand is to be used for intraocular manipulation.

What are the common challenges faced during direct gonioscopy?

There may be undue reflections that may arise due to scratches present in the goniolens. This is more common in reusable lenses, which tend to deteriorate over time. This can be avoided by the use of single-use gonioprisms.

The occurrence of corneal striae can obscure the visualization of the angle. This is an indicator of undue pressure on the gonioscope, which can be circumvented by titrating the pressure applied, or by removing and reapplying the gonioscope.(Figure 3)

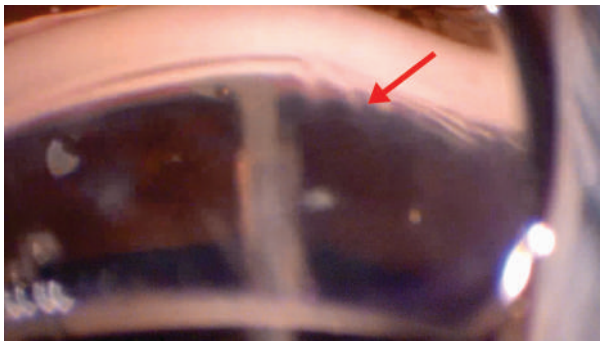

Figure 3

Undue pressure on the goniolens causing the formation of corneal striae.

Tips and tricks to master specific MIGS procedures

iStent G2

The iStent G2 has a vertical limb, which can be directly implanted into the TM by the dock and release maneuver. A dimple is created during the docking maneuver, followed by the release of the iStent from the trocar. (Figure 4)

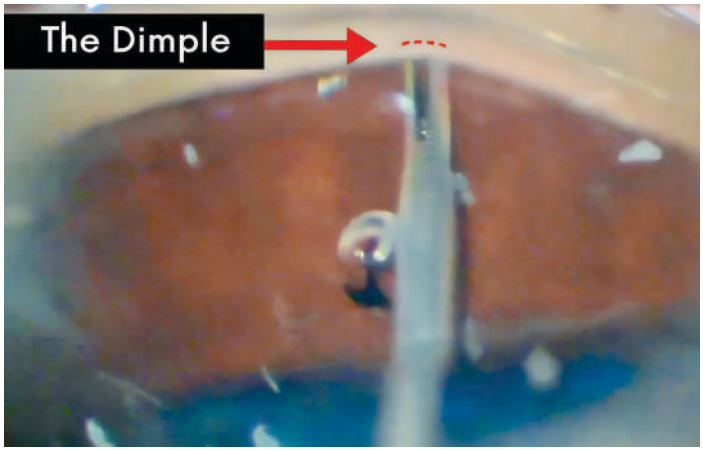

Figure 4 Legend -Creation of a dimple during the docking manoeuvre of iStent G2 implantation

Two iStents are implanted at a distance of at least 2 clock hours apart. Proper functioning of the iStents can be ensured by the presence of a perilimbal blanched area between the positions of the two iStents.[8]

In cases of intraoperative bleeding which obscures the angle, it may become difficult to identify if the iStent has been properly implanted into place. The 'nudge' technique, which involves careful nudging of the iris with the blunt end of the Sinskey hook can be done. This exposes the scleral spur, thus helps in the identification of the iStent's location.
Trochar malfunction, which may cause the iStent to rebound, can be overcome by controlled release of the trochar.

In cases of dislodged iStents due to superficial implantation, care must be taken to ensure proper implantation of the second iStent using the appropriate technique. Then the first dislodged iStent can be retrieved by rethreading the iStent into the trochar and ensure complete closure to prevent loss of the iStent. Then reattempt implantation using proper technique.

Bent Ab interno Needle Goniectomy (BANG)
The BANG technique involves excision of the trabecular meshwork using a goniotome, to increase the aqueous outflow. The goniotome is created by bending the distal 1 mm of a sterile 25-gauge hypodermic needle, using needle forceps. Under gonioscopic view, the newly created goniotome is used to excise 100 degrees of the trabecular meshwork nasally.[9]

The dorsal portion of the fashioned goniotome guards against incision of the posterior wall of the Schlemm's canal and maintains the plane of excision. In case of intraoperative bleed obscuring the view, viscoelastic agents can be used to clear the blood and provide tamponade against rebleeding, enabling completion of the procedure.

Suture GATT
Suture Gonioscopy Assisted Transluminal Trabeculotomy (GATT) is a conjunctiva-sparing excisional goniotomy technique, which increases aqueous outflow by excising the TM throughout its 360 degrees.

The anterior chamber is filled with an adequate amount of viscoelastic agent. The chamber must not be overfilled to prevent overcrowding of the angles. The MVR knife is used to create an opening in the nasal aspect of the trabecular meshwork, and the resultant bleed is cleared using viscoelastic agents. A 5-0 Prolene suture is the primary material employed in the procedure. One end of the suture is fashioned into an adequately sized mushroom tip using low-temperature dry cautery.[10]

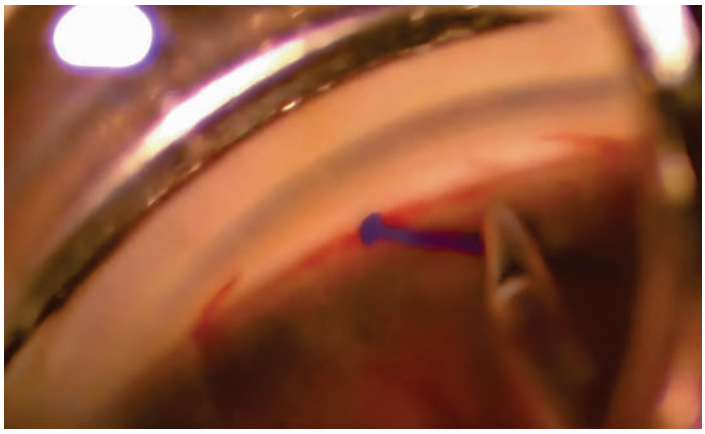

Figure 5
The mushroom tip of the 5-0 Prolene suture being threaded into the trabecular meshwork

The suture end with the mushroom tip is then threaded into the meshwork. (Figure 5) Around 22 to 25 passes are required to thread the suture through the entire 360 degrees of the meshwork. False passaging of the meshwork may occur due to kinking of the suture. This can be avoided by handling the suture with an MST forceps instead of the routine McPherson forceps. The success of this maneuver is gauged by the smooth passage of the suture, as well as the lack of resistance at any point during the procedure. The feel of resistance is a more important parameter and it must be recognized on time to avoid the creation of a false passage. The proximal end of the suture should be pulled through 360 degrees in an anti-clockwise direction, thereby excising the complete trabecular meshwork.

Kahook Dual Blade (KDB)
The KDB is a method of performing excisional goniotomy through a temporal clear corneal incision. Under direct gonioscopy, the nasal trabecular meshwork is approached. The sharp tip of the blade is engaged in the meshwork and an opening is created. The heel at the base of the footplate is then guided into the Schlemm's canal. The tip of the blade is then advanced along the canal, which stretches and elevates the trabecular meshwork between the two blades, thereby excising the meshwork.(Figure 6)

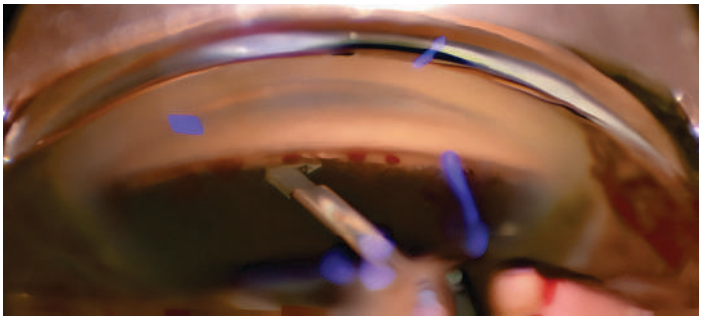

Figure 6
Image showing goniectomy performed using the Kahook Dual Blade

Three excisional approaches have been described. The 'mark and meet' approach involves marking the location of one end of the planned strip of the trabecular meshwork. The blade is then taken to the other end, and excision is done until the initial mark is met. The 'outside-in' approach involves marking the midpoint of the planned strip, and excising the trabecular meshwork from the two ends from outside to meet the midpoint on the inside of the planned strip. The 'inside-out' procedure involves the same procedure as the 'outside-in', but the excision is done from the midpoint towards the ends of the planned strip.[11]

Conclusion

MIGS is an ever-expanding technique in the surgical glaucoma landscape, that has widened the horizons beyond the conventional management techniques. It addresses a lacuna of glaucoma patients with difficulty of compliance to medical management, but do not have a disease severity that warrants conventional filtration techniques. The core to the performance of MIGS techniques is to master the art of direct gonioscopy[12]. This requires proper gonioscope selection, proper positioning of the patient and microscope and placement of a temporal corneal incision to visualize the nasal angle. Once direct gonioscopy is mastered, the ease of performance of the various MIGS procedures is enhanced. This chapter thus throws light on tips and tricks that can be employed to master direct gonioscopy and thereby MIGS procedures.

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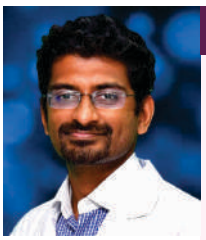

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GUESS THE SYNDROME

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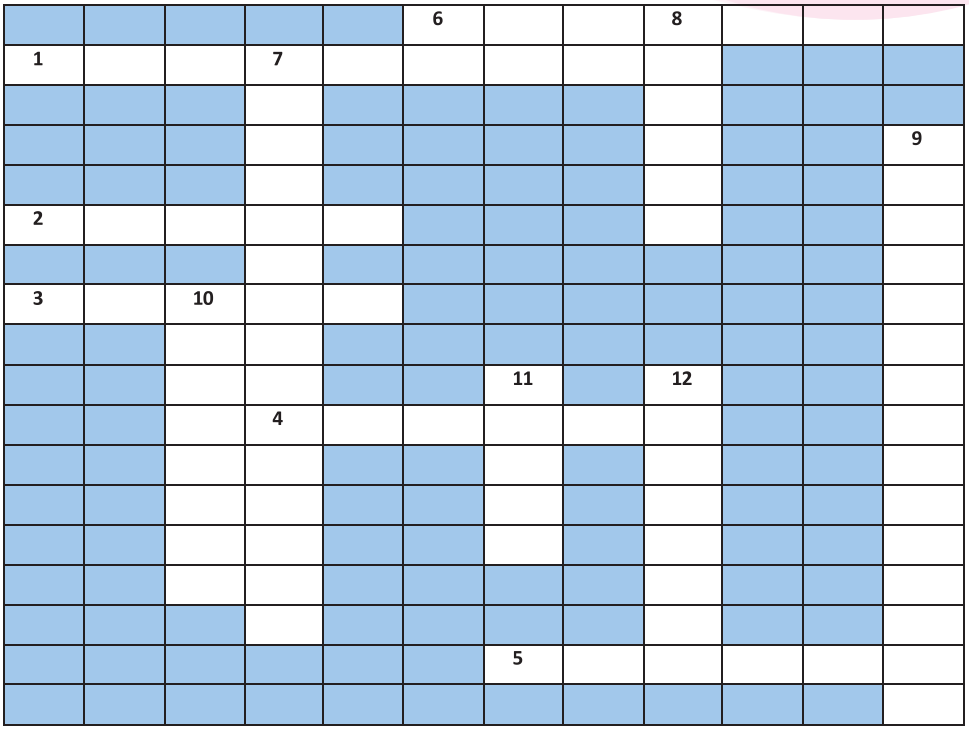
CROSSWORD PUZZLE



CLUES

ACROSS

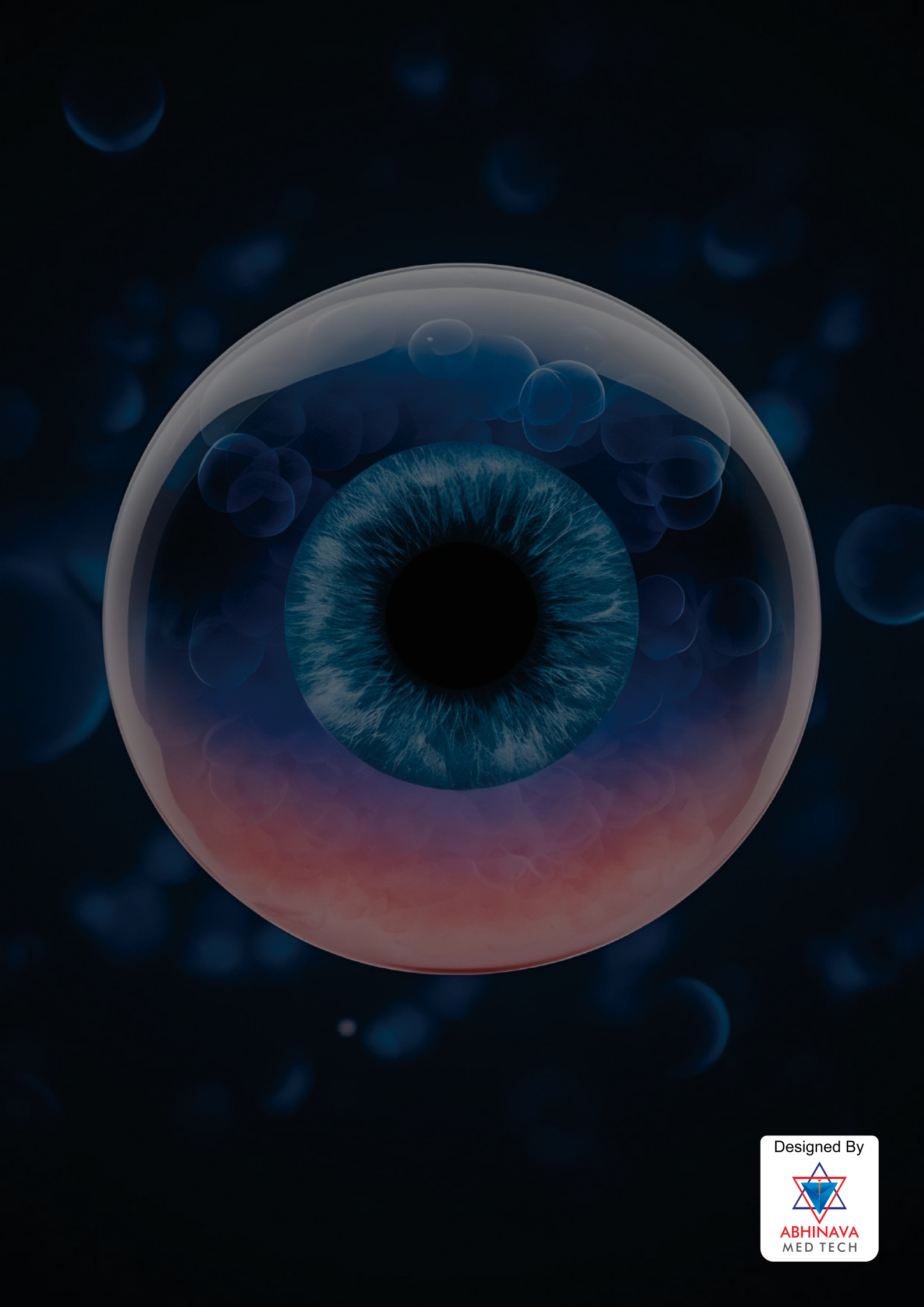
1. I wear a skin tag near my ear, my eyes have a dermoid stare, and my spine's not quite right. Who am I?
2. I struggle to hear and stumble in the night, my retina shows spicules in the light. What's my plight?
3. Three organs—eye, brain, and kidney—join hands in a rare trio. What's their shared name?
4. My lens bulges like a cone, my kidneys leak, and silence is my tone. What's this syndrome I own?
5. "I'm tall and thin, with fingers so long, my lens slips away like something's wrong. My heart may race, my joints may bend—what syndrome do I represent?"
6. “My face is frozen, my gaze is flat, sixth and seventh nerves don't chat. I stare ahead with no emotion—what's this cranial commotion?"

DOWN

7. My left eye turns in, and cant move out and cranial friend tries to help and eye shrinks within. What’s this curious spin?
8. I can’t look up when I look in, my eye’s movement is wearing thin. A tendon too tight, a gaze not right—what’s this syndrome in sight?
9. My face is sculpted, my lids have gaps, my eyes slant down in curious maps. A dysostosis with a twist—what’s the name you mustn’t miss?
10. “My eyes shine with a starry lace, a stellate iris lights my face. Though my vessels twist and vision may stray, my cheerful charm is here to stay. Who am I?”
11. My eyes slant up, my ears sit low, my chromosomes put on a show. With keratoconus risk and a loving heart—what syndrome plays this part?
12. My vitreous is empty, my retina’s thin, lattice lines mark where I’ve been. A connective tissue tale so slick—what’s this syndrome, quick?”

CROSSWORD ANSWERS

ACROSS	DOWN
1- GOLDENHAR	7- DUANERETRACTION
2- USHER	8- BROWNS
3- LOWES	9- TREACHERCOLLINS
4- ALPORT	10- WILLIAMS
5- MARFAN	11- DOWNS
6- MOEBIUS	12- STICKLER



Designed By

ABHINAVA
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