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maxivision SUPER SPECIALITY EYE HOSPITALS

Eyes Speak, We Listen

ENVISION

VOLUME - 1

MARCH 2026

A Maxivision Clinical Board Initiative
Clinical Communication & Visibility Committee

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30 Years of Excellence in Eye Care

TABLE OF CONTENTS

30 YEARS MAXIVISION

Trust | Care | Clarity

30 Years of Excellence in Eye Care

FOREWORD

Dr. GSK Velu,

Chairman & Managing Director, Maxivision Super Speciality Eye Hospitals

It is with great pride that the Maxivision Super Speciality Eye Hospitals Group presents the inaugural edition of 'Envision', our clinical newsletter.

In a field as dynamic as ophthalmology, structured knowledge-sharing and continuous clinical engagement are more important than ever. A clinical publication such as 'Envision' provides a formal platform to document experience, exchange perspectives, and reflect on practices that shape patient care across the network.

At Maxivision, patient care remains central to our approach, supported by clinical rigour and the considered adoption of technology. Envision brings these elements together—offering a space to share practical insights, evolving techniques, and learnings from day-to-day clinical practice to strengthen outcomes and consistency in care.

This initiative was made possible by the commitment to clinical excellence, our vision, the vision of Dr. KP Reddy, our partner doctors, and the support of Dr. Vivek Singh, Shalini Singh, Sharemeel Gandhi, and the management team. Their collective effort was central to bringing this initiative to life.

As we present this first volume, we hope 'Envision' will develop into a credible and enduring platform for clinical exchange, reflecting the depth of expertise and shared commitment across the Maxivision Group.

Dr. KP Reddy

Founder, Maxivision Super Speciality Eye Hospitals

It is a pleasure to introduce the first edition of Envision, a clinical publication from Maxivision.

Ophthalmic care today is defined not only by advancements in technology but also by clinicians' ability to interpret, adapt, and apply these developments in everyday practice. In this context, a dedicated platform becomes essential—one that brings together experience from across centres, encourages reflection on clinical work, and supports a more consistent approach to patient care.

Envision has been developed with this intent. It seeks to present practical perspectives drawn from routine clinical work, alongside evolving approaches in diagnosis and management. By sharing such insights, the aim is to strengthen clinical judgement, encourage discussion, and build greater alignment in how care is delivered across the organisation.

Maxivision's strength lies in its clinicians, whose skill and commitment continue to shape patient outcomes every day. This publication reflects that collective expertise and is an effort to make it more visible and accessible within the network.
It is hoped that Envision will continue to grow as a useful reference for clinicians across Maxivision, supporting both learning and day-to-day practice.

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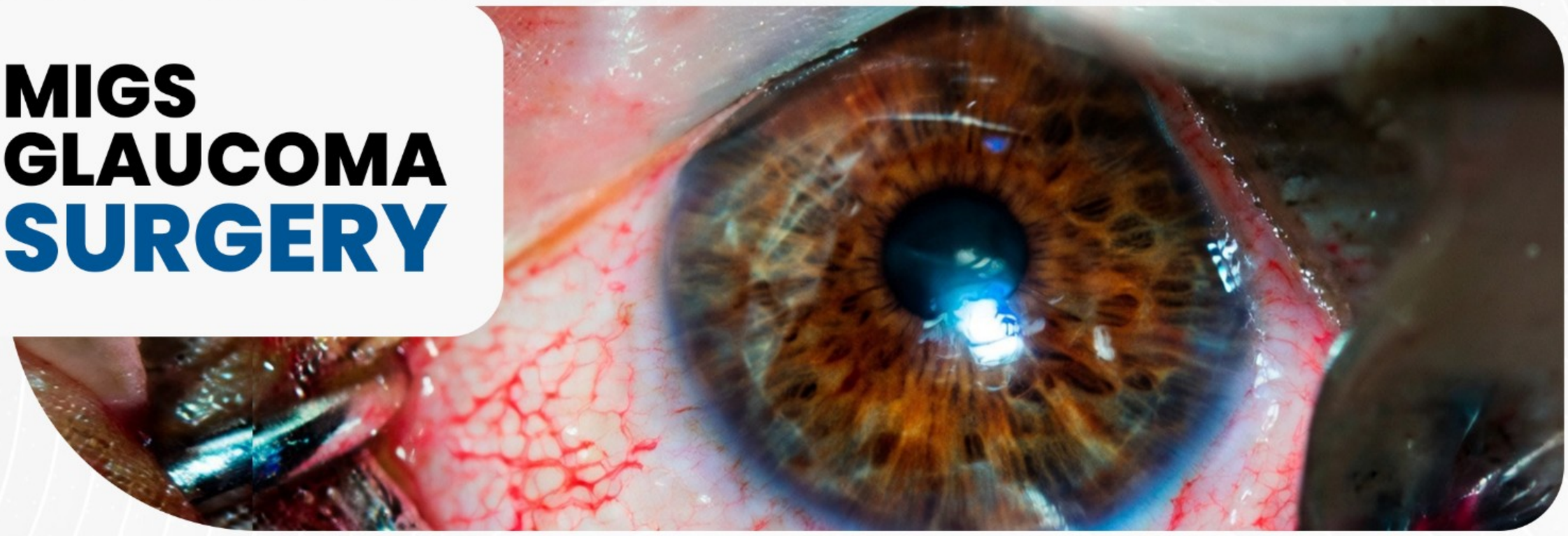
MIGS GLAUCOMA SURGERY



MINIMALLY INVASIVE GLAUCOMA SURGERY, INTRODUCED BY DR. RANI MENON, PERFORMED BY DR. JOHN DAVIS

HOSPITAL INNOVATION UPDATE: A NEW ERA IN GLAUCOMA CARE?

We are proud to announce that our hospital has successfully performed its first Minimally Invasive Glaucoma Surgery (MIGS) using the advanced KDB Glide (Kahook Dual Blade) technology.we did our first migs for a 55 yr old gentleman with iop around 30 mmhg even with triple drug therapy and surprisingly his pressures came down to 16 on next visit without any AGM. This milestone reflects our ongoing commitment to bringing the latest surgical advancements to our patients.

WHAT IS THE KDB GLIDE?

The KDB Glide, developed by New World Medical, is a specialized, single-use surgical instrument designed to perform a precise excisional goniotomy,in which a strip of trabecular meshwork is stripped off.

KEY BENEFITS FOR OUR PATIENTS

This new procedure offers several significant advantages for those managing primary open-angle glaucoma or ocular hypertension: High Safety Profile: The procedure is performed "ab interno" (from inside the eye), sparing the conjunctiva and minimizing trauma to surrounding tissues. Effective Pressure Control: Clinical studies show that KDB goniotomy can reduce intraocular pressure (IOP) by 20% or more. Reduced Medication Dependence: Many patients are able to reduce the number of daily glaucoma eye drops they require post-surgery. Rapid Recovery: Because it is minimally invasive, patients often experience faster healing times and can return to normal activities sooner than with traditional filtration surgeries. Versatile Approach: The KDB Glide can be performed as a standalone procedure or in combination with cataract surgery, often through the same tiny incision.

A NOTE FROM OUR SPECIALISTS

"The successful integration of KDB Glide into our glaucoma service allows us to offer a gentler, more effective solution for patients who aren't seeing results with medication alone but may not yet require more invasive traditional surgery," says our lead ophthalmologist. We look forward to continuing to provide this cutting-edge care to our community. If you or a loved one are managing glaucoma and would like to learn more, please contact us.

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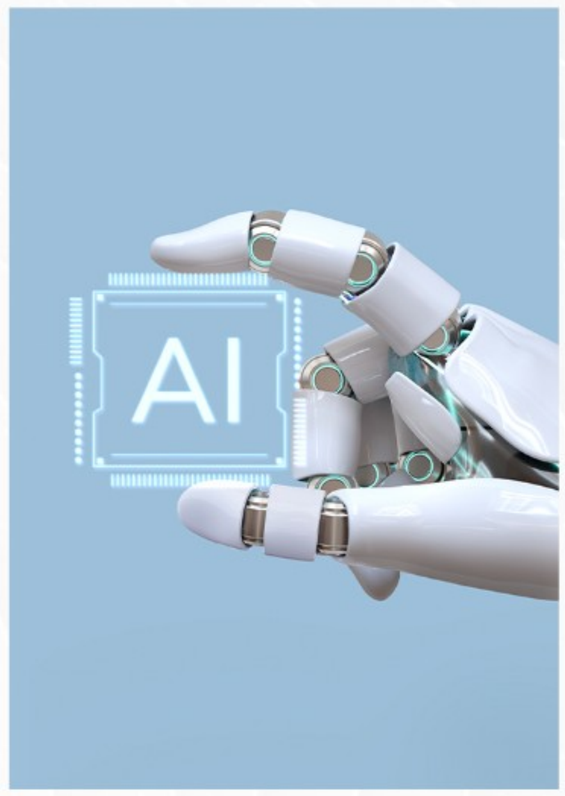
ROLE OF ARTIFICIAL INTELLIGENCE & MACHINE LEARNING IN OPHTHALMOLOGY

Akkara JD, Kuriakose A | Kerala Journal of Ophthalmology 2019;31:150–60

Every week, ophthalmology quietly shifts beneath our feet. Retinal cameras now talk to servers; OCT machines interpret their own scans; algorithms flag pathology before a clinician has opened the chart. Artificial intelligence (AI) and machine learning (ML) are no longer theoretical constructs debated at conferences; they are embedded in the workflow of forward-looking eye care centres worldwide. Akkara and Kuriakose's landmark review confronts this reality head-on, mapping the full landscape of AI applications across the breadth of ophthalmic practice. For the busy clinician, this paper answers the essential question: where, precisely, is AI reshaping what we do and how ready is it for the consulting room?



This is a comprehensive review synthesising published literature, commercially released software, and ongoing clinical trials relevant to AI and ML in ophthalmology. The authors surveyed the conceptual hierarchy underpinning these technologies, spanning classical machine learning, deep learning (DL), convolutional neural networks (CNNs), and generative adversarial networks (GANs), before systematically cataloguing applications across every major subspecialty.

KEY FINDINGS

01 Diabetic retinopathy: The first FDA-cleared autonomous AI diagnostic device (IDx-DR) detects 'more than mild' DR and diabetic macular oedema; offline AI (Medios AI) on a smartphone fundus camera achieved 93% sensitivity and 92.5% specificity, extending screening to low-connectivity settings.

02 Glaucoma: DL algorithms showed 95.6% sensitivity and 92% specificity for glaucomatous optic neuropathy on fundus photographs; the Pegasus system outperformed five of six ophthalmologists in detecting glaucomatous disc changes. A hybrid DL model on wide-field swept-source OCT achieved 93.1% sensitivity for glaucoma suspects.

03 Visual fields: Trained ANNs reached 93% sensitivity and 91% specificity for glaucoma VF evaluation, performing on par with clinicians. A DL model trained on 32,443 HVFs (CascadeNet-5) could predict future visual fields up to 5.5 years from a single baseline input.

04 Retinopathy of prematurity: The i-ROP system achieved 95% diagnostic accuracy by quantifying arterial and venous tortuosity, matching expert ophthalmologist performance.

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05 Age-related macular degeneration: Multiple ML algorithms grade ARMD from both colour fundus photographs and OCT, and ML can predict the requirement for anti-VEGF injections before treatment is clinically indicated.

06 Beyond the retina: AI detects keratoconus from Pentacam, Scheimpflug, and Orbscan data; grades cataracts from slit-lamp and fundus images with >93% accuracy; plans squint surgery via support vector regression; and predicts posterior capsule opacification risk (87% accuracy).

07 Systemic disease from fundus photography: Google's DL model, trained on 284,335 patients, predicted age (±3.26 years), gender (AUC 0.97), smoking status (AUC 0.71), systolic BP (±11.23 mmHg), and major adverse cardiac events (AUC 0.70) from fundus photographs alone. ML can also identify white matter hyperintensities, cognitive impairment, dementia, and Alzheimer's-associated retinal vascular changes.

08 IOL power calculation: AI-based formulas including Hill-RBF (v2.0, n=12,419 eyes), Ladas Super Formula, and Clarke Neural Network supplement traditional biometry, though head-to-head comparisons with Barrett Universal II and Holladay 1 have not yet demonstrated superiority.

CONCLUSIONS, DISCUSSION & IMPLICATIONS FOR PRACTICE

The authors conclude without ambiguity: the era of AI in ophthalmology has arrived. The evidence reviewed demonstrates that machine learning algorithms can equal or exceed human expert performance across retinal imaging, visual field interpretation, corneal assessment, and systemic risk prediction domains that collectively span the majority of a busy ophthalmic practice. Of particular clinical relevance is the maturation of offline AI: tools that no longer depend on cloud servers place high-performance diagnostic capability directly into smartphone-based fundus cameras, dramatically widening the reach of expert-level screening to rural and under-resourced settings.

However, the authors are measured in their enthusiasm. Real-world accuracy can diverge from validation cohort performance; the 'black box' problem, where the rationale for a diagnosis remains opaque, continues to impede clinician trust, though interpretability tools such as attention heatmaps offer a partial remedy. Critically, no currently available system integrates the full diagnostic matrix for complex conditions such as glaucoma (IOP, gonioscopy, disc, perimetry, and OCT together), meaning AI remains a powerful adjunct rather than a replacement for clinical judgement.

The implications for ophthalmologists are immediate and practical. AI is best deployed where its strengths are most needed: population-level screening programmes, teleophthalmology platforms, and virtual triage clinics where reducing onward referrals carries both clinical and economic value. Inbuilt segmentation in current OCT machines is already a form of AI that every clinician uses daily; the transition to richer AI-assisted interpretation is therefore evolutionary, not revolutionary. What is required of the ophthalmologist is not merely passive acceptance, but active engagement: understanding what each tool measures, recognising its failure modes (high myopia causing false negatives in glaucoma AI; physiological cupping causing false positives), and retaining ultimate clinical authority. The authors close with a charge that resonates across the profession, know the tools available to you, and use them wisely.

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CLINICAL CHARACTERISTICS, RISK FACTOR ANALYSIS, AND OUTCOMES OF GRAFT REJECTION AFTER DESCEMET MEMBRANE ENDOTHELIAL KERATOPLASTY

Dr. Shalini Singh, Md Hasnat Ali, Dr. Sunita Chaurasia | Indian Journal of Ophthalmology 2025;73:1729–34 | LV Prasad Eye Institute, Hyderabad

From Our Own Cornea Team: A Landmark Institutional Study on DMEK Rejection

Descemet membrane endothelial keratoplasty (DMEK) has rapidly become the gold standard for endothelial keratoplasty, prized in large part for its impressively low rejection rates compared to penetrating keratoplasty (PK) and Descemet stripping endothelial keratoplasty (DSEK). Yet graft rejection, even at a rate of 1-6%, remains a clinically consequential event one that can devastate endothelial cell reserves and ultimately cost a patient their graft. The critical questions that cornea surgeons have long wrestled with are: who is truly at risk, when is the danger greatest, and how long must topical steroids be maintained to protect the graft? These are exactly the questions that Dr. Shalini Singh, working with Dr. Sunita Chaurasia and the biostatistics team at LV Prasad Eye Institute, Hyderabad, has now addressed in a rigorous, real-world institutional study. Drawing on one of the largest single-centre DMEK series in India spanning over seven years and more than 1000 eyes Dr. Singh's work delivers evidence-based, practice-changing guidance on DMEK rejection that is directly applicable to our clinical setting.

Study Design and Methods

This was a retrospective comparative study conducted at the Shantilal Shanghvi Cornea Institute, LV Prasad Eye Institute, Hyderabad, covering the period from January 2017 to March 2024. Of 1026 eyes of 935 patients who underwent DMEK during this period, 45 eyes (4.38%) were excluded due to primary graft failure, leaving 981 eyes eligible for rejection analysis. Twenty-five eyes of 25 patients were identified as having experienced allograft rejection after DMEK and formed the study group. These were compared against a carefully selected control group of 98 eyes of 98 patients who underwent DMEK during the same period and had no rejection episode, with a minimum follow-up of two years the period established as most sensitive for rejection events.

Graft rejection was diagnosed on the basis of established clinical criteria: decreased vision with corneal oedema in a previously clear graft, with or without keratic precipitates, anterior chamber inflammation, and photophobia. Graft failure was defined as no restoration of corneal clarity within three months of the rejection diagnosis. Eyes that recovered were assessed for endothelial cell loss (ECL) by specular microscopy. Statistical analysis used logistic regression for both univariate and multivariate risk factor modelling, and Kaplan-Meier survival analysis described cumulative graft survival probability. Treatment of rejection episodes followed an intensive prednisolone acetate 1% protocol, with IV methylprednisolone added in select severe cases. The standard postoperative steroid regimen maintained topical prednisolone twice daily up to six months, tapering to once daily until two years post-surgery.

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KEY RESULTS

01

Rejection incidence: The overall rejection rate was 2.54% (25 of 981 eligible eyes) over a mean follow-up of 2.56 years (range 2-8 years), consistent with published global rates of 0-6%.

02

Patient profile: The median age of the rejection group was significantly younger at 53 years (IQR 45-62), compared to 65.5 years (IQR 56.2-70.8) in controls re-flecting younger age as a key susceptibility factor.

03

Timing of rejection: The vast majority (88%) of rejection episodes occurred within the first two years of surgery 52% within the first year and 36% between one and two years. Only 12% occurred beyond two years, underscoring the critical early window.

04

Clinical presentation: 96% of patients were symptomatic. The most common pre-sentation was reduced vision (24 eyes), followed by corneal oedema (22), keratic precipitates (20), and photophobia (12). Only one patient had the classic Kho-dadoust line, and one was diagnosed incidentally. Mean symptom duration before clinic presentation was 11 days.

05

Significant risk factors (multivariate analysis): Younger age at surgery, male gender, re-bubbling, cessation of topical steroids, and surgical indication emerged as independent risk factors. Indications carrying the highest rejection risk were failed prior graft (OR 20.66; 95% CI 5.34-79.94), post-cataract surgery corneal oedema (OR 5.57; 95% CI 1.1-28.15), and corneal oedema from inflammatory causes (OR 18.53; 95% CI 5.59-33.33) all significantly higher risk than Fuchs endothelial dystrophy.

06

Steroid non-compliance: Non-use of topical steroids at the time of rejection was a major independent risk factor (OR 8.33; 95% CI 2.08-33.33). Notably, 24% of the rejection group were not on steroid therapy at the time of diagnosis.

07

COVID-19 vaccination: No significant temporal association between COVID-19 vaccination and graft rejection was found. Only 8% of vaccinated patients had re-jection within the clinically defined 4-6 week window; 84% had no adverse event following vaccination.

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KEY RESULTS

08 **Outcomes:** 68% of eyes (17/25) recovered graft clarity after the rejection episode. However, only 41% of these remained clear at last follow-up. Mean endothelial cell loss following rejection was a severe 72.5%. The 6-12 month graft survival probability after a rejection episode was 70.8%, falling to 65% at 1-3 years post-rejection.

09 **Kaplan-Meier graft survival:** Overall graft survival was 89.7% at 1 year, 81.9% at 2 years, 80% at 3-4 years, and 77.9% at 5-8 years. The survival curve stabilised after 2 years, with no additional graft failures from rejection beyond that point.

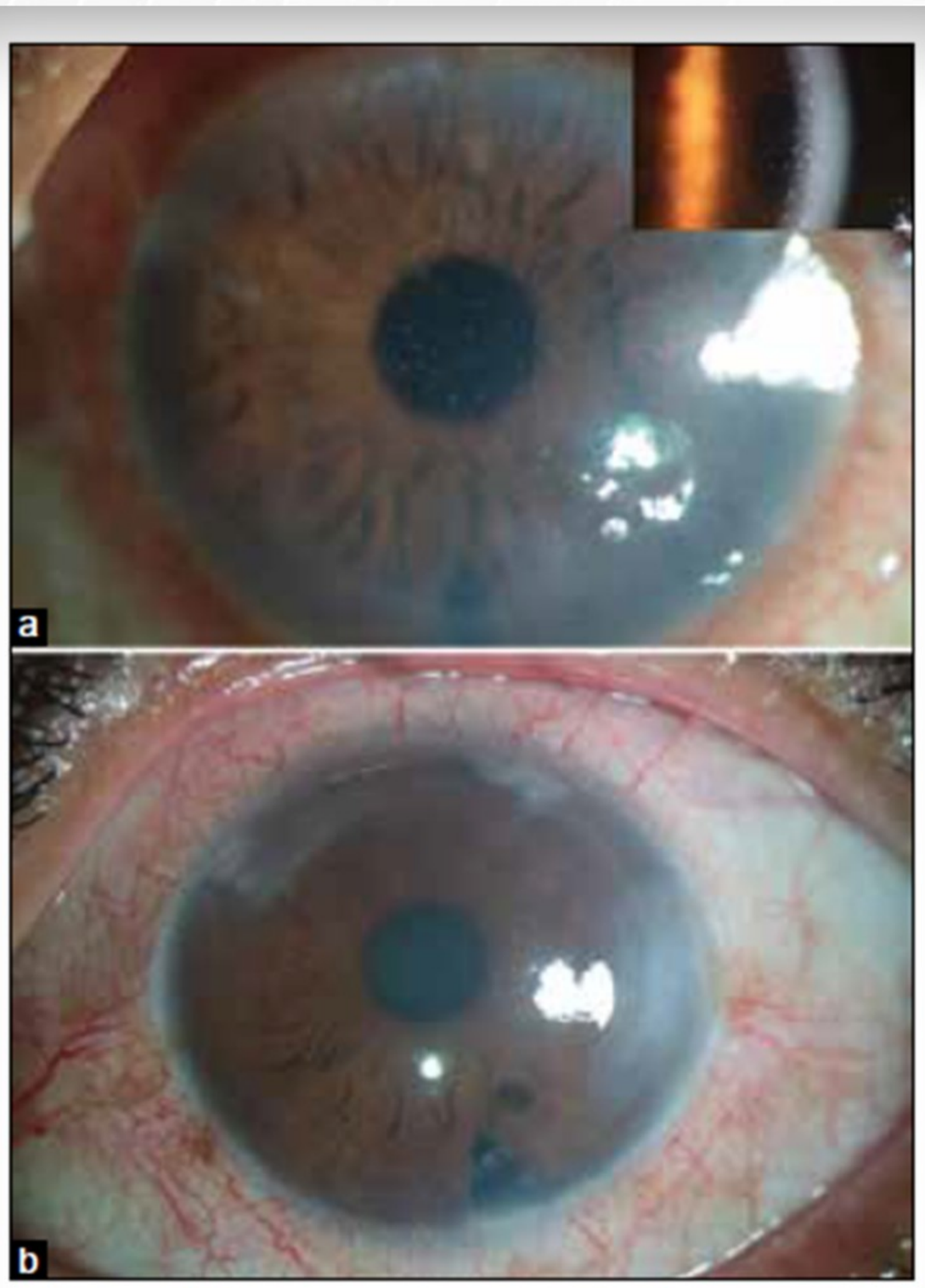

Figure 1: (a and b) Representative images of graft rejection after DMEK. (a) Slit-lamp photograph showing perilimbal congestion, corneal edema with diffusely scattered large keratic precipitates (highlighted in inset) in a female patient with 20 days history of blurred vision. (b) Slit-lamp photograph showing diffuse corneal edema and conjunctival congestion in a male patient with 4 days history of blurred vision

CONCLUSIONS, DISCUSSION & IMPLICATIONS FOR PRACTICE

Dr. Singh's study delivers several practice-defining conclusions that should directly inform how we counsel patients, prescribe steroids, and schedule follow-up after DMEK. The finding that 88% of all rejections occurred within the first two years is a clear mandate: topical steroid therapy must be continued at the recommended maintenance dose for a minimum of two years post-DMEK and should not be discontinued prematurely, regardless of how stable the graft appears. This is especially pertinent given that rejection symptoms can be subtle or even absent in some patients the average delay between symptom onset and clinic presentation in this study was 11 days, a window in which irreversible endothelial damage can accumulate.

The risk stratification emerging from this study is equally instructive. Patients undergoing DMEK for failed prior grafts particularly failed DSEK carry a rejection risk that is approximately 20 times higher than those with Fuchs endothelial corneal dystrophy. Post-cataract surgery corneal oedema and inflammatory causes of corneal endotheliopathy carry similarly elevated risks. These are precisely the cases that demand more vigilant postoperative monitoring, more conservative steroid tapering, and proactive patient education about early rejection symptoms. Younger male patients and those who have required rebubbling represent additional high-risk subgroups warranting heightened vigilance.

The severity of endothelial cell loss following rejection a mean of 72.5% underscores that even a recoverable rejection episode carries a heavy biological cost. The post-rejection graft survival of only 65% at one to three years highlights the domino effect: rejection leads to endothelial attrition, which accelerates graft failure, which then necessitates re-grafting in a sensitised host. This cycle reinforces the primacy of prevention over treatment: keeping patients compliant on steroids, maintaining close follow-up in the first two years, and actively monitoring high-risk indication groups are the most powerful interventions available. The reassuring finding that no significant temporal link to COVID-19 vaccination was identified allows clinicians to advise vaccinated patients without undue alarm about immunological risk to their graft.

Dr. SHALINI SINGH
Cornea, Cataract & Refractive surgeon
MBBS, DOMS, DNB, FLVPEI

Dr. Singh and the cornea team at LV Prasad Eye Institute have produced a study that sets a high benchmark for institutional DMEK outcome analysis in India. The prospective research agenda she identifies including HLA incompatibility profiling, defined steroid protocol studies, and systematic documentation of asymptomatic rejection charts the path forward for the field. For our clinical team, this work is both a reference and a reminder: DMEK may be the lowest-rejection-risk keratoplasty we offer, but the patients who do reject need our earliest recognition and most decisive management to protect what remains of their endothelial reserve.

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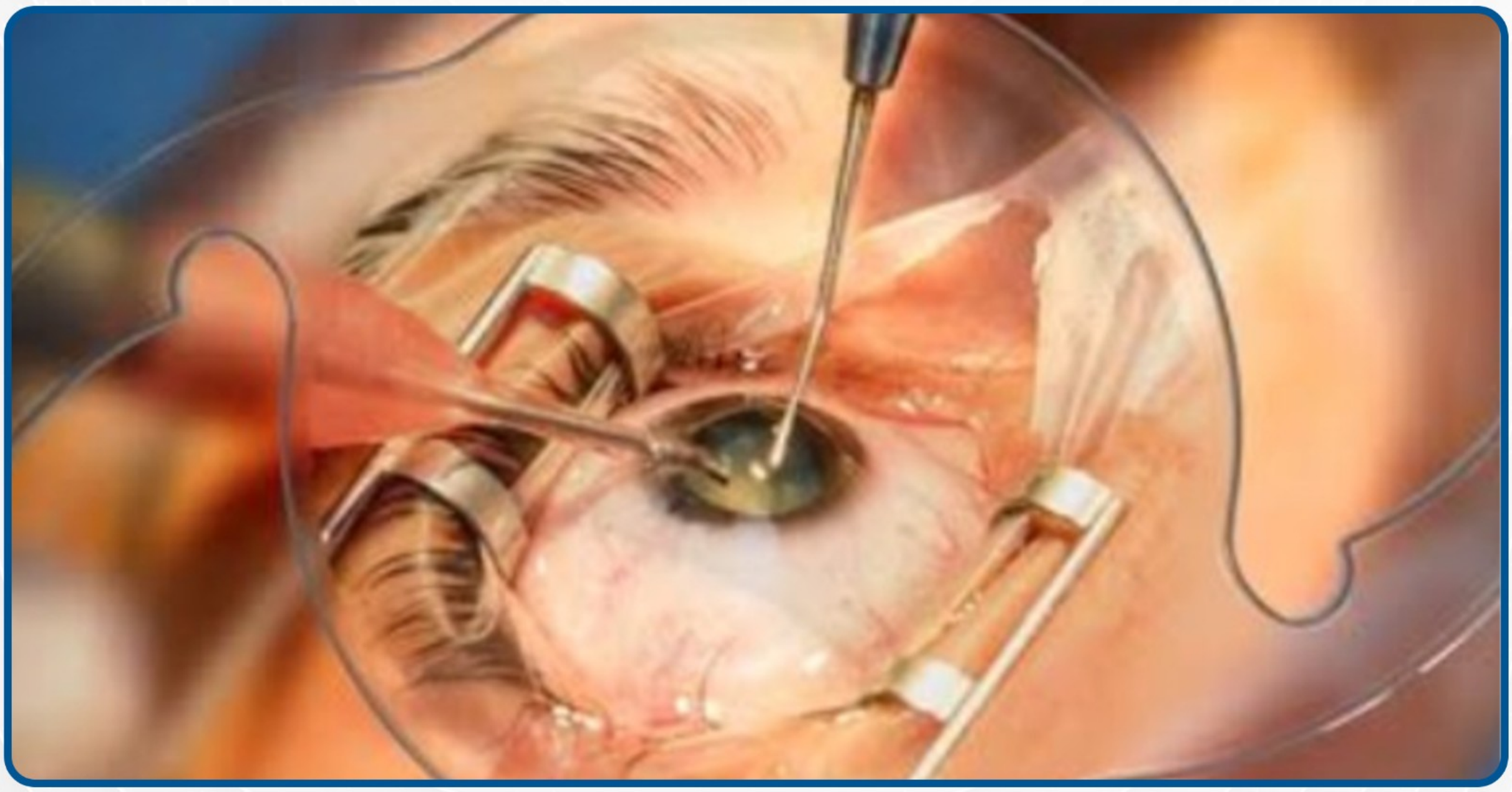
ELEVATING EXCELLENCE: DR. VIVEK SINGH'S CME INITIATIVE AT MAXIVISION EYE HOSPITAL

Building a Stronger, More Informed Team Across the Maxivision Group

THE IMPERATIVE OF CONTINUOUS MEDICAL EDUCATION

In medicine, standing still is moving backwards. The pace at which ophthalmology evolves from surgical techniques and intraocular lens (IOL) technology to diagnostic tools and patient counselling approaches means that even experienced clinicians and allied healthcare professionals must commit to lifelong learning. Continuous Medical Education (CME) is not merely a professional obligation; it is a direct investment in patient outcomes.

When a counsellor understands the nuances of premium IOL options, a patient makes a better-informed decision. When an optometrist is fluent in pre-operative evaluation protocols, the surgical team receives higher-quality workups. When a doctor is current on evolving indications for complex lenses like toric IOLs, complication rates fall, and patient satisfaction rises. Across every layer of an eye care institution, education creates a compounding effect, small improvements in knowledge translate into large improvements in care. At Maxivision Eye Hospital, this philosophy is actively practised, not merely preached.



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AN INTERNAL CME PROGRAMME BUILT FOR THE WHOLE TEAM

Dr. Vivek Singh, Cataract and Refractive Surgeon at Maxivision Eye Hospital, Kukatpally, Hyderabad, has taken a proactive step toward institutionalising this culture of learning. Over a series of structured sessions conducted virtually via Zoom, Dr. Singh has delivered targeted educational programmes to three distinct audiences within the Maxivision family: internal doctors, optometrists, and patient counsellors. Together, they form a growing CME curriculum that has the potential to be scaled across the entire Maxivision group.

SESSION SPOTLIGHT: PRE-OPERATIVE EVALUATION FOR CATARACT SURGERY

Audience: Optometrists

Optometrists are often the first clinical point of contact for a cataract patient. Their ability to accurately identify, document, and communicate findings directly influences surgical planning.

The session began with a thorough grounding in cataract types cortical, nuclear, capsular, and mature/total cataracts ensuring that optometrists could accurately characterise the lens pathology they encounter during slit-lamp examination. Dr. Singh then walked participants through the complete pre-operative evaluation framework, covering:

- Structured history taking to capture visual complaints, systemic conditions, and priorocular history.
- Vision testing standards and interpretation in the context of cataract grading.

- Pupil examination and its implications for surgical planning.
- Slit-lamp evaluation and when it is indispensable versus when clinical approximation may be made.
- Biometry principles, the importance of IOL power calculation formulas (including Barrett, Holladay, and SRK/T), and scenarios that require biometry to be repeated.
- Indications for corneal topography, particularly before premium lens selection.
- Dry eye testing and its role in optimising pre-surgical ocular surface health.
- B-scan ultrasound and its use in eyes with media opacity.

By equipping optometrists with this knowledge, the session directly contributes to higher-quality surgical workups and reduces pre-operative errors ultimately translating into better surgical outcomes for patients across all Maxivision branches.

SESSION SPOTLIGHT: CATARACT COUNSELLING AND IOL SELECTION

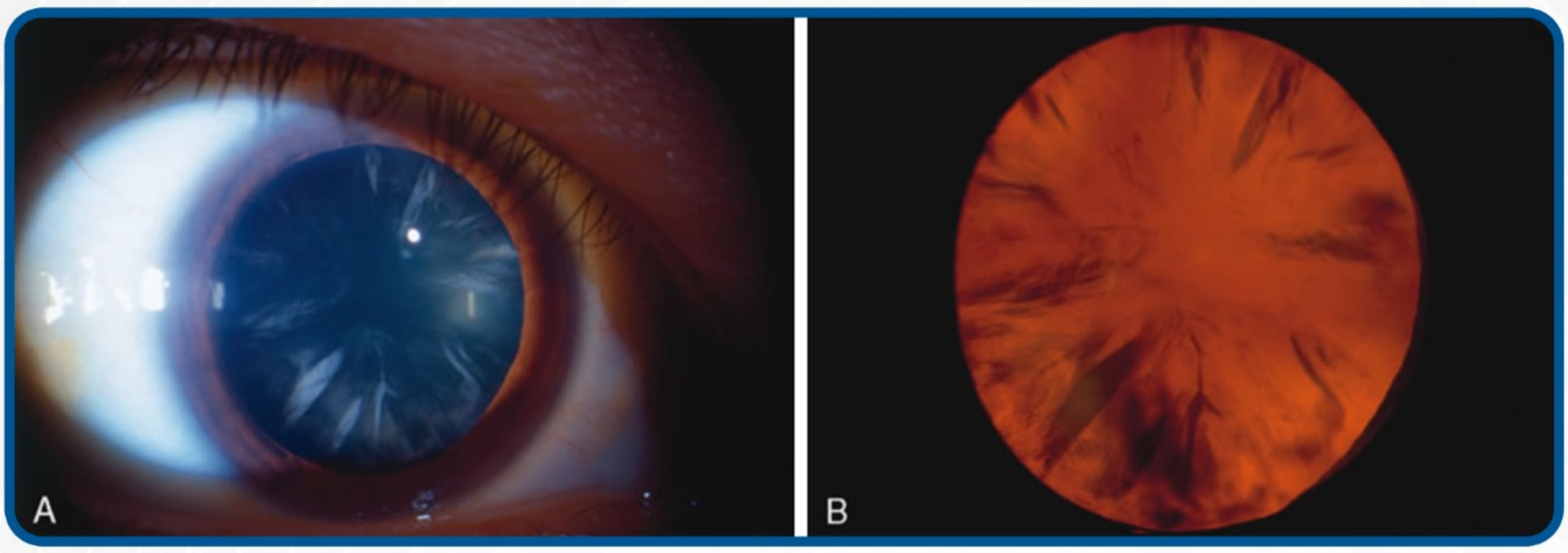
Audience: Patient Counsellors

A well-informed counsellor can be the difference between a patient choosing an appropriate premium IOL and settling for a lens that does not match their lifestyle or worse, opting out of surgery altogether due to confusion or anxiety. Dr. Singh's counsellor-focused session was designed to bridge the clinical and communicative worlds, arming the counselling team with the foundational knowledge needed to guide patients confidently through one of the most consequential decisions of their visual lives.

The session covered the full spectrum of counselling essentials, including:

- A clear, patient-friendly explanation of what a cataract is and how it progresses.
- The difference between manual small incision cataract surgery (SICS) and how to phacoemusification communicate their relative merits to patients.
- The IOL landscape from monofocal to toric, EDOF, and trifocal lenses including hydrophilic versus hydrophobic materials and aspheric versus non-aspheric optics.
- Planning frameworks that align patient lifestyle and visual expectations with the appropriate IOL category.
- Cash versus insurance pathway management.
- A practical rundown of the specific IOL portfolio available at Maxivision including Indian trifocals, EDOF alternatives like Lucidis, toric options at various price points (including BVI Isopure and Hoya toric alternatives), and premium options such as Acridiff and Tridiff ensuring counsellors can speak accurately about the products they are recommending.

Particular emphasis was placed on not overlooking lower-cost package options (₹12,000 and ₹17,000 packages), ensuring that no patient is lost to follow-up due to cost concerns and that the team is equipped to offer appropriate alternatives without compromising clinical standards.

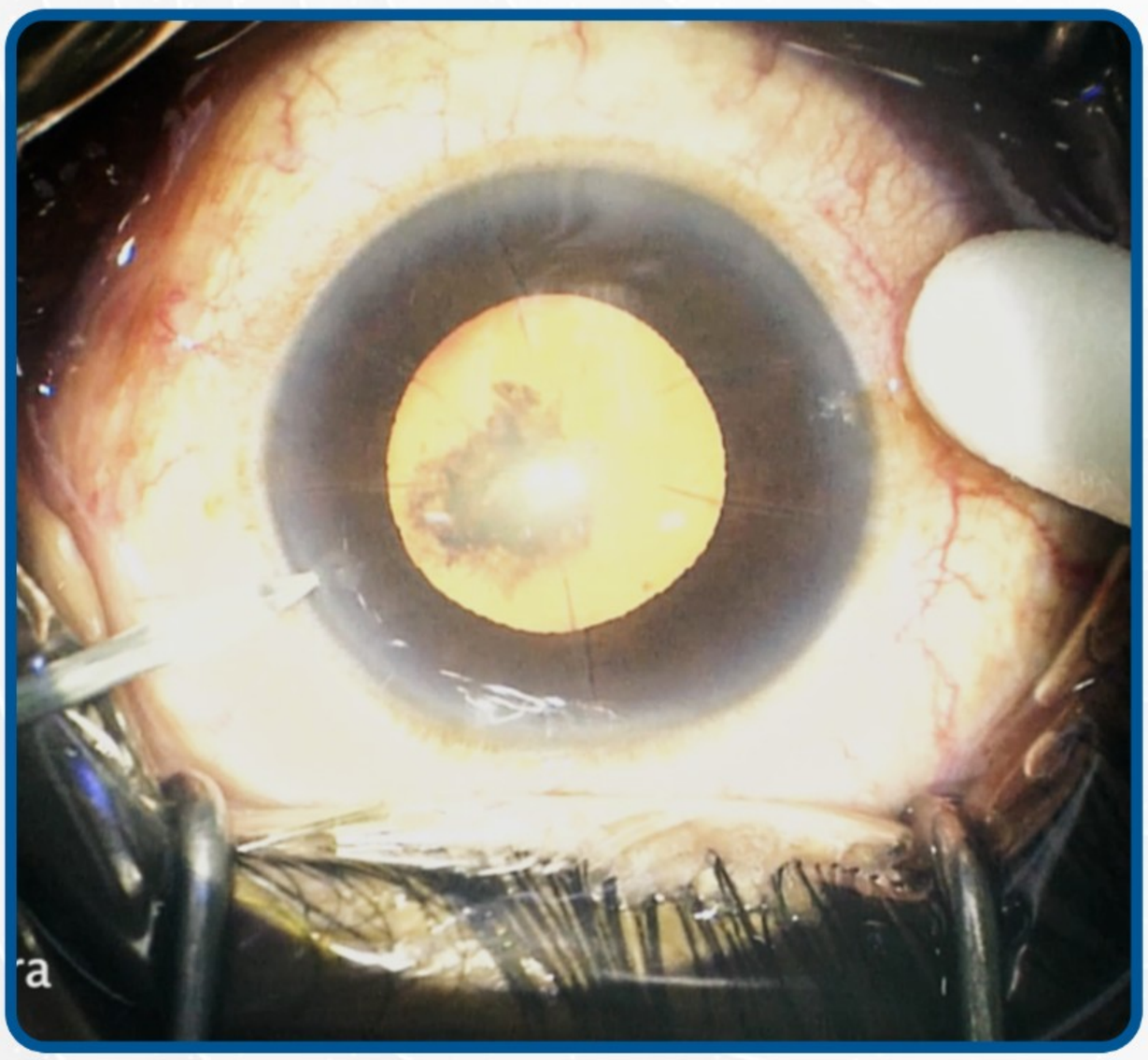


SESSION SPOTLIGHT: TORIC IOLS GETTING THEM RIGHT

Audience: Doctors and Surgical Team

Astigmatism affects a significant proportion of cataract patients up to 46% have clinically meaningful astigmatism exceeding 0.5 dioptres, and approximately 39% have corneal astigmatism greater than 1 dioptre. Unaddressed astigmatism after cataract surgery is a leading cause of patient dissatisfaction, particularly for those who have invested in premium lenses. Toric IOLs represent the most effective surgical solution, but their success is critically dependent on correct patient selection, meticulous pre-operative planning, and precise intraoperative execution.

Dr. Singh's most technically advanced session delivered as both a standalone lecture and in conjunction with a presentation on surgical nuances covered the full toric IOL pipeline from Why to How. The sessions drew on Dr. Singh's published research (Singh VM, Ramappa M, Murthy SI, Rostov AT. Toric intraocular lenses: Expanding indications and preoperative and surgical considerations to improve outcomes. Indian J Ophthalmol. 2022;70(1):10–23), lending the programme significant academic credibility.



PRE-OPERATIVE PLANNING

Participants were taken through the importance of understanding astigmatism type (with-the-rule versus against-the-rule), the evolving role of posterior corneal astigmatism (PCA) in calculation accuracy, and the use of modern nomograms including Barrett's toric calculator, Abulafia-Koch, and Baylors as well as devices that measure total corneal power (Galilei, Pentacam, Cassini, anterior segment OCT). The session also addressed surgically induced astigmatism (SIA), emphasising the importance of centroid vector calculation and consistent incision technique.

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TORIC AXIS MARKING: THE MOST CRITICAL SURGICAL STEP

A dedicated presentation co-authored by Dr. Singh and Dr. Namratha Cardoza from L V Prasad Eye Institute addressed one of the most technically demanding aspects of toric IOL surgery: accurate axis marking. The session reinforced the 'rule of one-third', whereby a 10-degree rotational error eliminates one-third of the toric effect and a 30-degree error renders the lens ineffective, even inducing astigmatism in a new meridian.

Participants gained working knowledge of the full range of marking modalities available today:

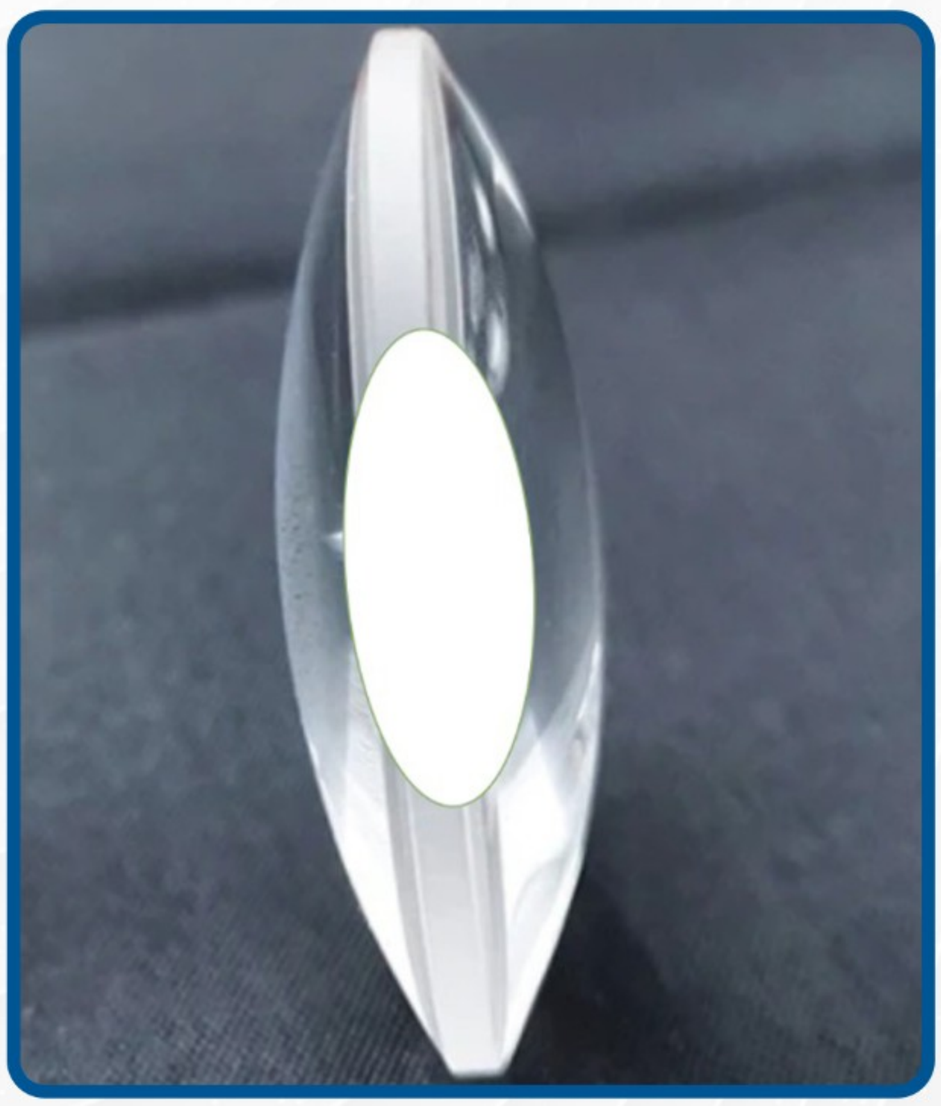
- Manual marking (freehand, bubble marker, pendular marker, tonometer marker) with reference and graduation techniques.
- Digital image-guided systems: Callisto (Carl Zeiss), Verion (Alcon), ORA, iTRACE, and TrueGuide.
- App-based toric marking tools (toriCAM, iToric Patwardhan).
- Laser-assisted alignment via Catalys and LENSAR platforms.

The session also expanded the clinical horizon by presenting outcomes data on toric IOL implantation in eyes with complex corneal conditions including keratoconus, penetrating keratoplasty, DALK, PMCD, and corneal scars challenging the traditional belief that toric IOLs are limited to straightforward cases.

WHY THIS INITIATIVE MATTERS FOR THE MAXIVISION GROUP

The Maxivision group serves a large and diverse patient population across multiple centres. Sustaining and growing the trust that patients place in the institution requires that every team member, regardless of role or branch, operates with a shared standard of knowledge and communication. Dr. Singh's CME programme is a meaningful step toward that goal.

Greater participation from across the Maxivision group would amplify the programme's impact significantly. When optometrists at every branch apply the same pre-operative evaluation standards, surgical teams receive more consistent, higher-quality data.



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JOIN THE CONVERSATION

Dr. Vivek Singh's CME sessions represent an investment not only in knowledge, but in the collective identity of Maxivision as an institution that takes clinical excellence seriously. These sessions are open to all members of the Maxivision family whether you are a consulting ophthalmologist, a first-year optometrist, or a counsellor encountering premium IOL conversations for the first time.

We encourage every branch head, department coordinator, and team leader within the Maxivision group to nominate team members for upcoming sessions and to ensure that past recordings are circulated and discussed. The curriculum will continue to grow future sessions are expected to cover additional areas of cataract and refractive surgery, furthering the programme's reach.

DR. VIVEK M SINGH

Sr. Cataract & Refractive Surgeon
MBBS, DNB, Fellowship

Continuous education is not a luxury; it is the foundation on which great eye care is built.

At Maxivision, that foundation is growing stronger.

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ULTRASTRUCTURAL AND HISTOPATHOLOGIC FINDINGS AFTER PARS PLANA VITRECTOMY WITH A NEW HYPERSONIC VITRECTOR SYSTEM

Pastor-Idoate S et al. | PLoS ONE 12(4): e0173883 | Published April 11, 2017

A NEW INSTRUMENT FOR THE VITREORETINAL SURGEON

The quest to refine pars plana vitrectomy (PPV) has long centred on a single tension: how to cut more efficiently while causing less collateral damage. Conventional pneumatic guillotine vitrectors (GV) have benefited from decades of engineering refinement, higher cut rates, smaller gauges, optimised duty cycles, yet a fundamental mechanical ceiling may be approaching. Against this backdrop, a prototype ultrasound-based hypersonic vitrector (HV) has emerged as a conceptually distinct alternative. Rather than cutting vitreous with a reciprocating blade, the HV deploys low-amplitude ultrasonic (US) energy at 28.5 kHz to liquefy vitreous in the immediate vicinity of its tip, reducing it to near-water viscosity and aspirating it through a single, continuously open port. The design eliminates the risk of vitreous strand entrapment between port edges and needle — a known limitation of guillotine systems — while permitting smaller port sizes and larger inner lumen diameters, resulting in lower flow resistance and lower infusion pressures. This paper by Pastor-Idoate and colleagues represents the first qualitative histopathological and electron microscopic assessment of what this new instrument actually does to retinal tissue, vitreous collagen, and the crystalline lens — questions that every vitreoretinal surgeon considering this technology will rightly want answered before accepting it into their operating theatre.

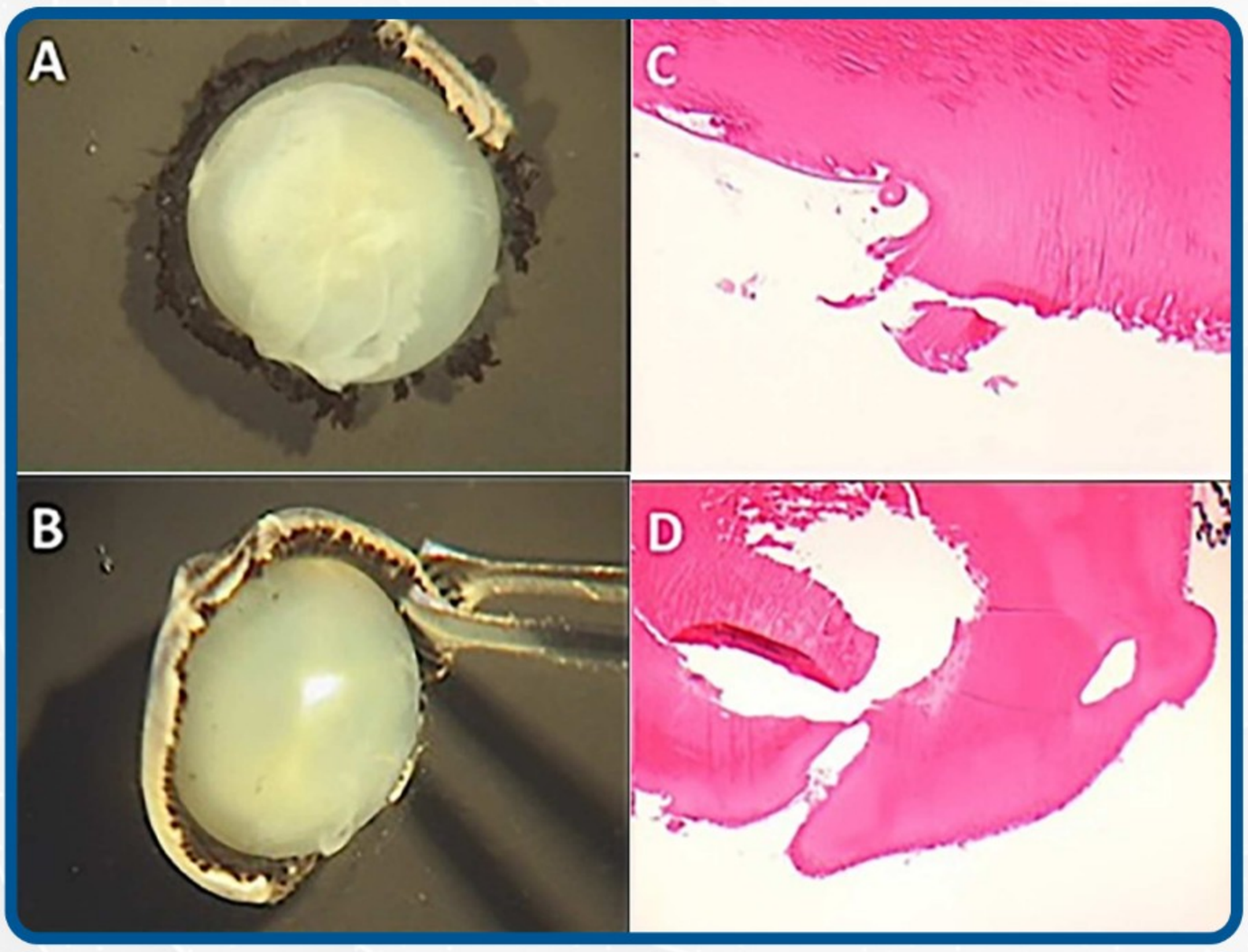

Fig 5. Macroscopic figures showing the effects of touching a guillotine (A) or hypersonic (B) vitrector to the posterior capsule of a cadaveric porcine crystalline lens. Microscopic analysis showing disruption of the posterior capsule of the lenses is extensive with the guillotine vitrector (C) and focal with the hypersonic vitrector (D). Artifactual loss of tissue is also seen in (D).

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STUDY DESIGN AND METHODS

This was a comparative ex vivo and in vivo preclinical study across three specimen groups: 14 porcine cadaveric eyes, 20 eyes in ten live anaesthetised Landrace swine, and six human cadaveric eyes (Manchester Eye Bank; donors aged 30–80 years). All eyes underwent PPV using either the prototype HV or a Bausch & Lomb 23-gauge pneumatic GV, both run on the Stellaris PC Vision Enhancement System. Four porcine cadaveric crystalline lenses were additionally used to assess direct instrument-to-lens contact effects. GV cut rates ranged from 1000–5000 CPM, with each 1000 CPM increment equating to 10% HV ultrasonic power (range 10–50%); HV energy was less than 5% of that used in conventional phacoemulsification. Both instruments were held 3–5 mm from the macula and optic nerve head, with Venturi aspiration at 50–600 mmHg. Undiluted vitreous samples were collected via a vitreous trap technique for transmission electron microscopy (TEM). Retinal and lens specimens were fixed, sectioned at 4 microns, and stained with haematoxylin-eosin, periodic acid-Schiff, and Masson trichrome, with all slides reviewed in masked fashion by two independent ophthalmic pathologists. Live porcine experiments were conducted under full surgical anaesthesia, with animals euthanised at procedure completion.

KEY RESULTS

01 No macroscopic retinal or optic nerve head defects were observed with either the HV or GV across all specimen groups, confirming gross anatomical safety at all power settings tested.

02 Porcine cadaveric retinas showed comparable histological changes with both instruments: vacuolisation and fragmentation at the nerve fibre layer (NFL) and ganglion cell layer (GCL), and inner limiting membrane (ILM) separation without frank disruption. No clear dose-response relationship was identified between US power level (10%–50%) and degree of retinal change.

03 Human cadaveric retinas demonstrated ILM fragmentation and separation after both GV and HV PPV. Differential interference contrast (DIC) microscopy highlighted ILM changes with greater clarity. Critically, no extensive cellular injury, thermal damage, trans-mural vessel necrosis, or RPE layer damage was identified in the HV specimens.

04 Live porcine retinas showed inner retinal vacuolisation (NFL and GCL) with both instruments, and ILM separation without disruption. There were no histopathological differences between the HV and GV groups, and no differences between vitrectomised and non-vitrectomised (nasal control) retinal areas in the ONH analysis.

05 Crystalline lens contact: direct HV tip touch produced small, focal posterior capsule disruptions, whereas the GV tip caused more extensive capsular damage at comparable duration — attributed to the HV's reduced US power, continuous port design, and the higher collagen content of the lens relative to the vitreous.

06 Transmission electron microscopy of vitreous — a first: this study is the first to evaluate vitreous collagen fibril changes at TEM level after PPV. Both instruments fragmented vitreous collagen (normally very long, continuous fibrils), but fragments were consistently shorter after HV than GV PPV across all tested power levels, indicating more efficient vitreous gel disruption. Fragmentation increased with increasing US power in the HV group.

CONCLUSIONS, DISCUSSION & IMPLICATIONS FOR PRACTICE

The central message of this first-in-kind qualitative assessment is reassuring, but appropriately measured: the hypersonic vitrector produced retinal histopathological changes qualitatively comparable to those seen with the conventional guillotine vitrector, with no evidence of the thermal injury, RPE damage, or extensive cellular destruction that had been a theoretical concern with intraocular ultrasound energy. The observed inner retinal changes — NFL and GCL vacuolisation, ILM separation — are acknowledged by the authors to be potentially attributable to postmortem tissue artefact or suction-related forces rather than to ultrasound per se, a distinction that will require controlled quantitative studies to resolve.

The most striking and clinically meaningful finding is the superior vitreous collagen fragmentation achieved by the HV. More complete disruption of the collagen fibril network reduces vitreous viscosity and elasticity, improving aspiration flow dynamics within the vitrectomy system. This could translate, in future clinical iterations, to more thorough vitreous removal with less mechanical traction on the vitreoretinal interface — particularly relevant in complex cases such as proliferative vitreoretinopathy, diabetic tractional detachment, or dense vitreous haemorrhage. The reduced posterior capsule disruption on direct lens contact with the HV compared to the GV is an additional safety signal worth noting.

The study's limitations are clearly delineated by the authors and should frame how these results are interpreted. All live swine were sacrificed immediately post-procedure, precluding any assessment of long-term retinal functional consequences; no electroretinography or visual evoked potential data were obtained. The human cadaveric sample (n=6) is too small for statistical inference, and cadaveric tissue is inherently imperfect as a surrogate for the living vitreoretinal unit. The study is explicitly qualitative — it was not designed to quantify injury thresholds or dose-response safety margins between the two devices.

For the vitreoretinal surgeon, the take-home is this: the hypersonic vitrector is a mechanistically sound and conceptually distinct technology that, in this preliminary assessment, does not introduce new patterns of retinal injury beyond those observed with conventional guillotine cutting. Its superior vitreous liquefaction efficiency and favourable single-port design address genuine limitations of guillotine systems. Quantitative safety and efficacy studies — incorporating electroretinographic functional assessment, longer-term in vivo survival experiments, and ultimately first-in-human clinical trials — are the essential and necessary next steps before this technology can be considered for adoption into routine vitreoretinal surgical practice.

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Together, we continue to learn, innovate, and lead in eye care.