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Al-Shifa Journal of Ophthalmology

A Journal of
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Editorial: Beyond the Slit Lamp and computers: The Healing Power of Eye Contact

Mahmood Ali

Introduction:

Modern eye care is packed with amazing technology. We spend most of our days staring at scans, tapping on keyboards, and looking through slit lamps. Yet there is a strange irony in what we do: we dedicate our lives to saving sight, but we often forget to actually look our patients in the eye.

When we stare at screens while someone talks, we send a subtle message that we are not fully present. To a person worried about going blind, that lack of connection feels isolating.

Active listening starts when we pause and give patients our complete focus. People rarely walk into our clinics with just physical symptoms. They bring heavy fears about losing their freedom, their jobs, and their connection to the world around them.

Simply looking up and letting a patient speak without jumping in validates those feelings. That tiny habit builds a level of trust no advanced scanner can ever match.

Our real character as doctors is tested when we have to break bad news, like diagnosing advanced glaucoma or explaining permanent vision loss. In those heavy moments, our physical presence matters far more than our words. Simple body language like a warm nod or an open posture can soften a painful diagnosis. It turns a cold clinical report into a compassionate human moment.

Our ultimate goal as eye care providers is to improve lives, not just treat organs. Great surgical skill and accurate data are essential, but they mean very little without a human connection. Let's make a conscious effort to look up from our screens and truly see the people in front of us.

ORIGINAL ARTICLE

Comparison of 0.3% Nepafenac and 0.1% Nepafenac in Prevention of Cystoid Macular Edema After Uneventful Phacoemulsification

Hooria Khan[1], Muhammad Akmal Khan[1], Yaseen Lodhi[1], Marrium Shafi[1]

Abstract:

Objectives: To compare changes in mean central macular thickness (CMT) in patients receiving 0.3% nepafenac once nightly versus 0.1% nepafenac three times daily following uneventful phacoemulsification.

Methodology: A randomized controlled trial was executed at the Ophthalmology Department of POF Hospital over six months from April 2025 to September 2025. A total of 130 patients, aged 50–80 years, were recruited using non-probability consecutive sampling and randomly allocated to either the 0.1% nepafenac or 0.3% nepafenac group (65 patients each). Pre-operative CMT was assessed using optical coherence tomography (OCT). One group received 0.1% nepafenac three times daily, while the other received 0.3% nepafenac once nightly. Treatment began one day before surgery and continued for six weeks after uneventful phacoemulsification. Post-operative CMT was assessed by OCT at six weeks. Data were analyzed using SPSS version 25. Categorical variables were expressed as frequencies and percentages, continuous variables as mean ± standard deviation. Paired and independent sample t-tests were used, with $p < 0.05$ considered statistically significant.

Results: The mean age of participants was 69.61 years; 51.5% were male and 48.5% were female. Both regimens significantly reduced CMT at six weeks (mean pre-operative CMT: 235.69 µm; mean post-operative CMT: 231.17 µm; $p < 0.001$). However, there was no significant difference in post-operative CMT between the 0.1% nepafenac group (232.48 µm) and the 0.3% nepafenac group (229.86 µm; $p = 0.848$).

Conclusion: Both 0.1% and 0.3% nepafenac were equally effective in reducing CMT and preventing cystoid macular edema following uneventful phacoemulsification. *Al-Shifa Journal of Ophthalmology 2026; 22(2): 70-75.*

1. POF Hospital, Wah Cantt.

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Introduction:

Phacoemulsification is a preferred procedure for cataract extraction and is globally associated with excellent visual outcomes. However, cystoid macular edema (CME) remains a significant post-operative complication that adversely affects vision[1,2]. Cystoid macular edema (CME), with an average occurrence of 0.2 % to 4.1 %, is one of the leading causes of reduction of visual acuity (VA) following uneventful phacoemulsification. It is defined by the fluid accumulation in the macula, leading to increase in macular thickness and impairment of central vision[3]. During phacoemulsification, surgical trauma can induce inflammation, disrupting the blood-retinal barrier. This disruption allows inflammatory mediators such as

prostaglandins to permeate the macular region, increasing vascular permeability and causing fluid leakage[4]. Pathophysiologically, the blood-retinal barrier breakdown is central to CME formation. Inflammatory mediators, particularly prostaglandins and cytokines, play a crucial role by enhancing vascular permeability. The resultant fluid accumulation in the macula leads to the characteristic cystoid spaces seen on optical coherence tomography (OCT)[5]. Risk factors for developing CME include diabetic retinopathy, uveitis, vitreomacular traction, and complicated surgeries with rupture of posterior capsule and loss of vitreous[6]. Nepafenac, a non-steroidal anti-inflammatory drug (NSAID), has been employed to prevent and treat CME due to its potent anti-inflammatory properties. Nepafenac is a pro drug that converts to its active form, amfenac, within ocular tissues, providing targeted inhibition of the cyclooxygenase enzyme and reducing prostaglandin synthesis. This action mitigates the inflammatory response associated with phacoemulsification and helps maintain the integrity of the blood-retinal barrier[7]. The 0.1% concentration has demonstrated effectiveness in reducing inflammation and CME incidence. However, the higher concentration of 0.3% nepafenac is hypothesized to offer enhanced anti-inflammatory effects, potentially providing superior protection against CME[8].

Nanda et al., 2022 reported that at the 6-week evaluation, the Nepafenac 0.3% drops once a day group had 1 patient (1.0%) with clinical CME, (p=0.477) [9]. Miyake et al., 2011 concluded that occurence of edema was significantly lower in the nepafenac 0.1% group (14.3%)[10]. Sarfraz et al., 2017 reported that CME was observed in one patient (3.3%) among patients who were treated with and received 0.1% Nepafenac with three times daily dose[11]. D Singhal *et al*., 2022 reported that efficacy of both 0.1% and 0.3% nepafenac was more than prednisolone at 6 weeks post-operative but was still significant[12]. Bardoloi N *et al.,* 2022 in his study comparing the two concentrations reported that 0.3% nepafenac showed more efficacy in prevention of Central Macular Thickness (CMT) in patients[13]. B Khan *et al., 2025* in his trial compared the efficacy of using a combination of 0.3% nepafenac at night and 0.1% nepafenac at day versus 0.1% nepafenac. He demonstrated that combination of concentrations was significantly more effective in reducing post treatment macular thickness[14].

The rationale for this study is to assess and compare the effectiveness of 0.3% nepafenac administered once a day versus 0.1% nepafenac administered thrice a day in preventing cystoid macular edema (CME) following uneventful phacoemulsification. While separate studies on the effectiveness of 0.3% nepafenac and 0.1% nepafenac exist in Pakistan, not many researchers have directly compared these two regimens in a single study. This study seeks to bridge a gap in literature, potentially offering new insights into the optimal dosing strategy for preventing CME, thereby improving patient outcomes and post-operative care in phacoemulsification surgery.

Methodology:

A Randomized control trial was conducted at the Department of Ophthalmology of POF Hospital, Wah Cantt for 6 months (from April 2025 to September 2025). Patients were chosen via non-probability consecutive sampling where all available subjects presenting in Eye OPD who met the specific inclusion and exclusion criteria within a designated time frame were selected for the study, until a predetermined sample size was reached. Sample size was determined with the help of WHO sample size calculator with significance level of 5% and power of study was set at 80%. Total sample size was 130 with 65 patients in each group. A double-blind design was used in which neither the patient nor the surgeons were aware of the drug strength

given to the patient. Institutional Review Board permission was obtained before this trial was conducted. All participating patients signed a written consent form before the study was conducted.

Individuals with prior history of vitreoretinal surgery were excluded and patients with ophthalmic conditions like corneal opacity, uveitis, glaucoma, poor mydriasis, lens dislocation, retinal and macular diseases were not included. Surgeries during which complications occurred during phacoemulsification such as damage to iris, posterior capsular rupture, nucleus drop and vitreous loss were excluded from the data. Moreover, Patients who were given steroids (topical or systemic) 15 days prior to the procedure, were given steroid injections through any method of administration 3 months prior, and individuals reporting any form of NSAIDs use within 7 days were also excluded from participation.

All patients with cataract (diabetic and non-diabetic, between 50 to 80 years of age) who agreed to take part in this study and fulfilled the inclusion criteria were selected. A senior ophthalmologist performed the anterior segment as well as dilated fundus examination on a slit lamp bio microscope, along with measurements of intraocular pressure. Spectral domain OCT was performed on selected patients, and pre-operative CMT was noted. Patients were categorized; Group A was given 0.1% Nepafenac (to be used thrice a day) and 0.3% Nepafenac (to be used once daily at night) was given to Group B. The drug was given one day prior to the surgery and continued for 6 weeks post-operatively. Phacoemulsification was performed by two senior surgeons with at least ten years of experience. Post-operative treatment of topical steroids and antibiotics were given along with trial medicine. Patients were followed regularly. After 6 weeks post-operatively, OCT was performed again, and post-operative CMT was noted. Statistical Package for Social Sciences (SPSS) version 25 was used to perform analysis. Qualitative data like age, gender, presence of diabetes, eye involvement was measured in terms of frequency and percentages. Quantitative data like pre-operative and post-operative CMT was presented as standard deviation and mean. Paired sample t-test was used to compare the two means i.e. central macular thickness before and after the procedure and comparison of the post-operative CMT between the two groups was done via Independent sample t-test with statistical significance set at $p < 0.05$.

Results:

A total of 130 patients were chosen for this study, these patients were divided into two groups, each group was given either 0.1% nepafenac or 0.3% nepafenac. All patients underwent unilateral phacoemulsification. The mean age of patients was 69.61years**.** There were a total of 67 (51.5%) male and 63 (48.5%) female patients. 63 (48.5) were right eyes and 67 (51.5%) were left eyes. Total 70 (53.8%) patients were non-diabetic and 60 (46.2%) patients were diabetic.

There was a significant decline in post-operative central macular thickness(232.48µm) in group A after phacoemulsification from baseline measurements (pre-operative CMT 236.69µm). Group B showed a similar trend as depicted in Table 1.

Table 1: Comparison between pre- and post-operative CMT.

Study Groups	Pre-operative CMT (µm)	Post-operative CMT (µm)
0.1% nepafenac	236.69	232.48
0.3% nepafenac	234.69	229.86

Individual t-test was used to evaluate the two post-operative CMT values (0.1% Nepafenac and 0.3% Nepafenac). However, the difference in post-operative macular thickness between the two groups was not statistically significant; post-operative CMT of 0.1% nepafenac was 232.48µm and post-operative CMT of 0.3% nepafenac was 229.96µm. P= 0.848, as depicted in Table 2.

Table 2: Comparison between mean post-operative CMT of both groups

Study groups	Post-operative mean CMT (µm)	p-value
Group A	232.48	0.848
Group B	229.86	0.848

Discussion:

CME is thought to be associated with eye inflammation. It is usually correlated with inflammation of uveal tract, retinal vein occlusion and diabetic retinopathy and is commonly encountered as a complication of phacoemulsification. In the process of natural lens being emulsified with implantation of artificial intraocular lens in posterior chamber, macular edema that occurs after this procedure is known as pseudophakic CME and this is also called Irvine-Gass syndrome. This rise in macular thickness is one of the most common causes of decreased visual acuity after cataract surgery[15]. Even though the exact pathophysiology is not yet defined, however the role of surgical trauma along with blood–retinal barrier disruption and release of prostaglandins is suspected[16]. Light toxicity and vitreomacular traction might also have a role[17]. Topical NSAIDs have been used with good therapeutic effects in controlling post-operative inflammation after cataract surgery, thereby reducing macular thickness. NSAIDs inhibit cyclo-oxygenase (COX) enzymes thus preventing the conversion of arachidonic acid to thromboxanes, prostacyclins, and prostaglandins which leads to decreased inflammation[9].

We compared the effectiveness of both strengths of NSAIDs. The main goal of this trial was to prevent the rise in central macular thickness after uneventful cataract surgery. A decreasing trend was seen in central macular thickness of both groups (Mean pre-operative CMT of 235.69µm to mean post-operative CMT of 231.17µm) with P=0.000 depicting that both the concentrations of NSAID are effective in lowering the CMT after surgery. While comparing the two groups, it was noted that there was slight difference in post-operative CMT of the two groups, 0.1% nepafenac had mean post-operative CMT of 232.48µm while 0.3% nepafenac had mean post-operative CMT of 229.86µm, but this difference is not significant p=0.848.

According to AK Nanda *et al*., 2022**,** 200 patients went through Phacoemulsification, at 6 weeks, 8 patients of 0.1% nepafenac and 3 patients of 0.3% nepafenac group had subclinical CMT but these were statistically insignificant[9]. D Singhal *et al*., 2022 reported in their study of 500 patients who were separated into 5 groups receiving nepafenac 0.1%, nepafenac 0.3%, bromfenac, preservative-free ketorolac, prednisolone acetate. The percentage of individuals with clinically significant CME was least in the groups who were given nepafenac 0.3% (1%) and 0.1% (1%) and greatest in those who were given prednisolone (4.3%) at 6 weeks though this difference was statistically insignificant (*P* = 0.34) [12].

Bardoloi N *et al.,* 2022 in their study stated that the difference between the mean CMT of the two concentrations demonstrated a significant difference (281.29 µm in 0.1% nepafenac group vs. 266.05 µm in 0.3% nepafenac group, *P* < 0.001) at 1 month and at 3 months (276.25 ± 12.25µm vs. 262.11

± 6.34µm in 0.1% nepafenac and 0.3% nepafenac groups, respectively, $P < 0.001$) [13]. PF Tzelikis *et al.,* 2018 in his study concluded that prophylactically after surgery of cataracts, nepafenac 0.3% was more effective in reducing macular thickness compared to placebo 5 weeks post-operatively[18].

The greater efficacy was with both nepafenac concentration was validated by the decrease in cases of treatment failures. Using nepafenac 0.3% once daily may offer greater post-operative convenience for patients and may help improve dosing adherence. Nepafenac 0.3% is easily endured as it is to be used just once daily as compared to three times daily dose of 0.1% Nepafenac. Both concentrations and doses are equally safe as compared to the results of previous clinical trials. Our study also validates that both of these concentrations of nepafenac are effective as these were given for 6 weeks in both groups with significant results.

Conclusion:

The study concluded that both the drug 0.3% Nepafenac once a day and 0.1% Nepafenac thrice a day for 6 weeks after phacoemulsification were equally effective in preventing cystoid macular edema after uneventful Phacoemulsification. Once daily dosing was convenient for patients as compared to thrice daily dosing.

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Authors Contribution

Concept and Design: Hooria Khan
Data Collection / Assembly: Hooria Khan
Drafting: Hooria Khan,
Statistical expertise: Hooria Khan and Marrium Shafi
Critical Revision: Hooria Khan, Marrium Shafi, Akmal Khan, Yaseen

ORIGINAL ARTICLE

Ocular Trauma in Pakistan: Trends, Causes and Medicolegal Implications

Muhammad Imran Saleem Channar[1], Hafsa Malik[1], Maham Imran[1]

Abstract:

Objectives: To characterize the clinical profile and medicolegal classification of ocular trauma presenting to a tertiary care hospital in Pakistan.

Methods: A retrospective study of 340 medicolegal cases (MLCs) conducted at Bahawal Victoria Hospital, Bahawalpur, from March 2020 to August 2025. Clinical data was retrieved from electronic medical records. Injuries were classified using the Birmingham Eye Trauma Terminology (BETT) system and Section 335 of the Pakistan Penal Code (PPC). Primary outcomes included demographics, mode, severity of injury, and presenting visual acuity. Secondary outcomes were associated injuries and complications. Statistical analysis was done by SPSS version 25. The chi-square test was used to compare the categorical variables, $p < 0.05$ was considered statistically significant.

Results: Males (mean age 35±15 years) predominated (289 cases, 85%). Fist blows were the most common mode (197 cases, 58%). Closed globe injury (CGI) occurred in 243 cases (71.5%), open globe injury (OGI) in 97 (28.5%). Associated injuries included adnexal trauma (67.1%), hyphema (32.9%), and orbital fractures (10%). Endophthalmitis developed in 31 (32%) OGI cases. Presenting visual acuity was ≥ 6/12 in 67.9% of the CGI group and 10.3% of the OGI group. Malingering was diagnosed in 24 cases (7.1%). Based on the PPC, 292 cases (85.9%) were classified as non-grievous hurt, 43 (12.6%) as Itlaf-i-salahiyyat-i-udw (permanent loss of visual function with the eyeball anatomically preserved), and 5 (1.5%) as Itlaf-i-udw (complete loss of the eyeball).

Conclusion: Assault-related ocular injuries predominantly affect young males. The high rate of endophthalmitis in open globe injuries (OGI) mandates timely referral and urgent treatment.
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Introduction:

Medicolegal cases (MLCs) represent a critical intersection between clinical and legal domains. An MLC is defined as a case requiring law enforcement investigation to establish legal responsibility under prevailing statutes[1]. Despite its high frequency in developing countries like Pakistan, comprehensive data on medico-legal aspects of the ocular trauma remains limited[2,3]. The accurate assessment of such cases hinges on two pivotal frameworks: a standardized clinical classification system and a practically applicable legal statute. For standardized clinical categorization, this study employed the Birmingham Eye Trauma Terminology (BETT) System. The BETTS is a universally recognized, standard classification system based upon

the integrity of the globe. The classification divides ocular trauma into Open Globe Injury (OGI), a full-thickness defect of the globe; and *Closed Globe Injury (CGI),* where the eyeball remains intact. BETT further categories the ocular trauma according to anatomical zone of injury (Zone-1, II, III) and the type of trauma like the ruptured globe, ocular penetration, ocular contusion and the intraocular foreign body (IOFB)[4].

Section 335 of the Pakistan Penal Code (PPC) provides legal classification of the bodily injuries**,** classifying them according to the severity of trauma[5]. Three medico-legal categories of trauma include:

1- Non-Grievous Hurt: Injury with no or partial, reversible loss of vision.

2- Itlaf-i-salahiyyat-i-udw: Injury causing permanent, irreversible loss of vision, without loss of the eyeball.

3- Itlaf-i-udw: Permanent loss of the eyeball.

Precise clinical classification of ocular injuries through systems like BETT is therefore a fundamental prerequisite for documenting correct medico-legal status of ocular injuries. The purpose of the present study was to document the demographic, clinical, and medico-legal profile of MLCs at a tertiary care center through the BETT system and the PPC classification, to identify the patterns of injury and the outcome, and to assess the prevalence of malingering in this population, thereby bridging the clinical and medicolegal domains.

Methodology:

A retrospective, descriptive, observational study of 340 MLCs presenting between March 2020 to August 2025, conducted at the department of Ophthalmology, Bahawal Victoria Hospital, Bahawalpur, Pakistan. Approval for the study was taken from the institutional ethical committee of the hospital. The study adhered to the declaration of Helsinki principles. Being a retrospective observational study, the sample comprised of all the medico-legal cases whose medical records were available and fulfilled the inclusion criteria. Data were collected by retrieving the medico-legal records saved in computer section of the department. The documents of all MLCs were thoroughly evaluated for completeness as per the inclusion criteria. Cases having incomplete records were excluded from the final analysis. The study included the cases of all ages and both genders who presented to our department for the treatment, documentation and medicolegal certification of their ocular injuries and gave full informed consent at the time of admission. Uncooperative cases (like children whose clinical examination was incomplete) and the cases whose consent form was not present in retrieved documents were excluded from the study. A patient was labelled as 'MLC' based on one or more of the following standardized criteria:1, A History of assault or suspected foul play. 2, Accidental trauma including road traffic accidents. 3, Patient/guardian request for medicolegal documentation. 4, Clinical judgment of potential legal implications. All MLCs were identified through the department's electronic medical records system using ICD-10 codes for ocular trauma (S05.0-S05.9) cross-referenced with medicolegal registration logs.

Because the highly sophisticated investigations needed for objective assessment and confirmation of malingering (visual evoked potentials, VEP, electroretinography, ERG and electrooculography, EOG) were not available, the diagnosis of malingering relied heavily on clinical suspicion, comprehensive clinical assessment and selective investigations (CT-scan/MRI, ocular B-scan ultrasonography and OCT). The patients were therefore diagnosed for ‘suspected malingering’ instead of ‘confirmed malingering’. Comprehensive clinical ocular examination was performed in all patients presenting as MLCs. Any life-threatening injuries were ruled out prior to performing any ocular examination.

To ensure consistency in clinical assessment, classification of injuries, and proper medicolegal documentation, all the medicolegal examinations and investigations for the present study were conducted by same practitioner. A detailed history was recorded, including the exact mechanism of injury, time of occurrence, location of the incident, and whether any first aid was administered. The presence of symptoms such as pain, photophobia, blurred vision, diplopia, or floaters was specifically elicited. Baseline uncorrected visual acuity (UCVA) and best-corrected visual acuity (BCVA) were assessed using a standard Snellen chart at 6 meters. For patients unable to read the chart, VA was assessed as counting fingers (CF), hand motions (HM), perception of light (PL), or no perception of light (NPL). Near vision was assessed using Jaeger's chart. A systematic examination was performed under adequate illumination. This included inspection of the periocular region for edema, ecchymosis, and lacerations. Eyelid eversion was performed to rule out foreign bodies. The anterior segment was examined using a slit-lamp biomicroscope to assess the conjunctiva, cornea, anterior chamber, iris, and lens for signs of trauma. Pupillary size, shape, and reaction to light (both direct and consensual) were meticulously evaluated. The presence of a relative afferent pupillary defect (RAPD) was tested using the swinging flashlight test. Extraocular movements were assessed in all positions of gazes. After ensuring the absence of a penetrating injury and with pupillary dilation using tropicamide 1% eye drops, a detailed fundus examination was performed using a direct and/or indirect ophthalmoscope to evaluate the status of vitreous, macula, optic disc, and peripheral fundus. Presence of any trauma related pathology such as vitreous hemorrhage, sub-ILM/intra-retinal/subretinal
hemorrhage, macular edema/hole, retinal tears/detachment, and commotio retinae/Berlins edema were assessed and documented. IOP was measured using a Goldmann applanation tonometer. In cases of suspected OGI, tonometry was deferred till surgical closure of the OGI. B-scan USG was performed in all patients having CGI and associated hazy ocular media that precluded posterior segment examination. The sonographic findings were documented in medical record of all the patients. Cases with high clinical suspicion of injuries to cranio-fascial and orbito-nasal skeleton underwent X-rays and computed tomography scans (Head & Neck, Orbit & Nasal cavity/sinuses). The investigation findings were documented in patient's medicolegal records.

Of the 410 retrieved medical records, medico-legal data of 70 Patients was found to be incomplete and these cases were excluded from the analysis. The final sample consisted of 340 cases. The Birmingham Eye Trauma Terminology System (BETTS)[4] was utilized for standardized classification of Ocular injuries. Suspected malingering was identified when the visual acuity testing showed inconsistent responses during repeated assessment (for example a changing visual acuity during repeat test or an inconsistency of monocular versus binocular visual acuity); pupillary reactions were normal, absence of anisocoria, and absent relative afferent pupillary defect (RAPD); the clinical examination was unremarkable for any significant finding (normal slit-lamp biomicroscopy, normal dilated fundoscopy, unremarkable B-scan ultrasonography and radiological examination). Descriptive statistics were calculated using SPSS version 25. Continuous variables were expressed as mean ± SD or median based on distribution. Categorical variables were presented as frequencies and percentages. Chi-square tests compared categorical variables, with $p<0.05$ considered statistically significant.

Results:

During the 5-year study period from March 2020 to August 2025, 340 patients were

registered as medicolegal cases (MLCs) of ocular trauma. Males predominated (289/340, 85.0%) with a male-to-female ratio of 7:1. The age of patients ranged from 7 to 75 years with a mean age of 35 ± 15 years, and the highest incidence occurred in the 21–40-year age group (210/340, 61.8%). Bilateral ocular involvement was observed in 47 patients (47/340, 13.8%). Detailed demographic characteristics are presented in Table 1.

Table 1: Demographic Characteristics of Patients (N=340)

Characteristic	Number of Cases	Percentage
1. Gender		
- Male	289	289/340 (85%)
- Female	51	51/340 (15%)
2. Age (Years)		
≤20	40	40/340 (12%)
21-40	210	210/340 (62%)
41-60	76	76/340 (22%)
>60	14	14/340 (4.0%)
3. Laterality		
- Unilateral	293	293/340 (86%)
- Bilateral	47	47/340 (14%)

Cases having CGI presented relatively sooner (within 6 ± 2 hours of injury) as compared to the cases having OGI (within 18 ± 6 hours of injury), this delay in presentation in OGI group is statistically significant ($p < 0.001$). The most common mechanism of ocular trauma was direct assault by fist blow (197/340, 58.0%), followed by assault with blunt objects (51/340, 15.0%), sharp objects (34/340, 10.0%), road traffic accidents (27/340, 7.9%), chemical injuries (10/340, 2.9%), and other causes (21/340, 6.2%). The distribution of injury mechanisms is summarized in Table 2.

Table 2: Mode of Injury (N=340)

Mode of Injury	Number of Cases	Percent
- Direct Assault (Blow/Fist)	197	197/340 (58%)
- Assault With Blunt Object(s) (Stone/Stick/Iron Bar)	51	51/340 (15%)
- Assault With Sharp Object(s)	34	34/340 (10%)
- Road Traffic Accident	27	27/340 (8%)
- Chemical (Alkali/Acid) Burns	10	10/340 (03%)
*- Others**	21	21/340 (06%)

**Includes falls, projectile injuries.*

Based on the Birmingham Eye Trauma Terminology System (BETTS) classification, closed globe injuries (CGI) constituted the majority (243/340, 71.5%) whereas open globe injuries (OGI) accounted for 97/340 cases (28.5%). Contusion was the most frequent subtype among closed globe injuries. The

anatomical distribution of injuries and presenting visual acuity patterns differed between CGI and OGI cases, with poorer visual acuity observed more frequently in open globe injuries. Detailed injury classification is presented in Table 3.

Table 3: Clinical Classification of Ocular Injuries (BETTS)

Type of Injury	Number Of Patients (N=340)	Percent
1. CGI	243 Eyes	243/340 (71%)
- *Ocular Contusion*	194	194/243 (80%)
- *Lamellar Laceration*	41	41/243 (17%)
- *Superficial Foreign Body*	08	08/243 (03%)
2. OGI	97 Eyes	97/340 (29%)
- *Globe Rupture*	27	27/97 (28%)
- *Ocular Penetration*	46	46/97 (48%)
- *Ocular Perforation*	04	04/97 (04%)
- *IOFB*	20	20/97 (21%)
Anatomical Zone of Injury 1. CGI (N=243)		
- *Zone I*	173	72%
- *Zone II*	31	13%
- *Zone III*	39	16%
2. OGI (N=97)		
- *Zone I*	33	34%
- *Zone II*	37	38%
- *Zone III*	27	28%
Visual Acuity at Presentation 1. CGI		
- *Grade-1: (≥6/12)*	165	67.9%
- *Grade-2: (6/18-6/36)*	32	13%
- *Grade-3: (6/60-3/60)*	20	08%
- *Grade-4: (<3/60-Light Perception (PL)*	18	07%
- *Grade-5: No Perception Of Light (NPL)*	08	03%
2. OGI		
- *Grade-1: (≥6/12)*	10	10%
- *Grade-2: (6/18-6/36)*	09	09%
- *Grade-3: (6/60-3/60)*	23	24%
- *Grade-4: (<3/60-PL)*	32	33%
- *Grade-5: (NPL)*	23	24%

According to Section 335 of the Pakistan Penal Code, the majority of injuries were classified as non-grievous hurt (292/340, 85.9%), while 43 cases (43/340, 12.6%) resulted in permanent visual impairment *(Itlaf-i-salahiyyat-i-udw)* and 5 cases

(5/340, 1.5%) resulted in complete anatomical loss of the globe *(Itlaf-i-udw).* The medicolegal classification of injuries is summarized in Table 4.

Table 4: Legal Framework of Ocular Injuries

SEVERITY OF INJURY*	**NUMBER OF CASES**	**PERCENT**
A. Non-Grievous Hurt	292	292/340 (86%)
B. Itlaf-i-udw *(Complete Loss of the Globe (Eyeball)/Severely Damaged Eyeball Requiring Evisceration/Enucleation)*	05	05/340 (02%)
C. Itlaf-i-salahiyyat-i-udw *(Anatomically preserved Eyeball with Complete loss of visual Function)*	43	43/340 (12%)

**Section 335, PPC*

Associated ocular and orbital injuries were common. Adnexal trauma occurred in 228 patients (228/340, 67.1%), while anterior segment injuries were observed in 105 patients (105/340, 30.9%). Posterior segment involvement was documented in 159 of 243 CGI cases (65.4%) and 50 of 97 OGI cases (51.5%). Endophthalmitis developed in 31 of 97 OGI cases (32.0%), with 19 cases (19/97, 19.6%) requiring evisceration or enucleation. Orbital fractures were detected in 34 patients (34/340, 10.0%), and 24 patients (24/340, 7.1%) met the criteria for suspected malingering. A detailed breakdown of associated injuries and complications is presented in Table 5. Twenty-four patients (7.1%; all females) were diagnosed for suspected malingering on the basis of normal clinical examination and unremarkable radiological investigations.

Table 5: Associated Injuries and Secondary Complications

Clinical Finding	Number Of Cases	Percent (%)
1. Adnexal Injuries	228	228/340 (67%)
A. Periorbital/Subconjunctival Hemorrhage	185	185/228 (81%)
B. Eye Lid Lacerations	43	43/228 (1%)
- Upper Eye Lid	28	28/43 (65%)
- Lower Eye Lid	11	11/43 (27%)
- Both Eye Lids	04	04/43 (09%)
- Associated With Canalicular Laceration	07	07/43 (16%)
2. Anterior Segment Injuries	105	105/340 (31%)
A. Traumatic Cataract	67	67/340 (20%)
- CGI	38	38/243 (16%)
- OGI	29	29/97 (30%)
B. Hyphema	112	112/340 (33%)
- Resolution Without Surgical Intervention	89	89/112 (80%)
- Requiring Surgical Intervention	23	23/112 (21%)
C. Secondary Glaucoma	38	38/340 (11%)

3. Posterior Segment Injuries (CGI)	159	159/243 (66%)
A- Vitreous Hemorrhage	89	89/243 (37%)
B- Pre/Intra/Subretinal Hemorrhage	34	34/243 (14%)
C- Commotio Retinae/Berlin Edema	23	23/243 (10%)
D- Traumatic Macular Hole	08	08/243 (03%)
E- Retinal Detachment	05	05/243 (02%)
4. Posterior Segment Injuries (OGI)	50	50/97 (51.5%)
A- Endophthalmitis	31	31/97 (32%)
B- Severely Damaged Globe (Requiring Evisceration/Enucleation)	19	19/97 (20%)
5. Orbital Injuries	88	88/340 (26%)
Orbital Fracture(S)	34	34/340 (10%)
A- Floor	19	19/34 (56%)
B- Medial Wall	09	09/34 (27%)
C- Combined (Floor and Medial Wall)	06	06/34 (18%)
D- Orbital Injury Requiring Surgery	17	17/34 (50%)
Associated Maxillo-Facial Injuries	14	14/340 (04%)
6. Malingering/Pre-Existing and Self-Inflicted Injuries	24	24/340 (7%)
A. Normal Clinical/ Radiological Examination	18	18/24 (75%)
B. Pre-Existing/Self-Inflicted Injuries Claimed As Medicolegal Injuries	06	06/24 (25%)

Discussion:

An online search of the PubMed/PubMed Central, MEDLINE, Scopus, Web of Science, Google Scholar, EMBASE, and Pak Medinet was performed using the terms like 'medicolegal ocular trauma,' 'medicolegal cases in ophthalmology,' but the search results did not show any single-center study on medicolegal cases with sample as large as of the present study (340 medico-legal cases). Some single-center studies related to ocular trauma were shown including Tripathy et al., 2016[6] and Wasfy et al[7]., 2009 in their study represented the largest single-center study on medicolegal ocular trauma, providing crucial data for both clinical management and legal matters.

The finding that 58% of injuries resulted from fist assault aligns with that reported by the world health organization and the research findings from southeast Asia, confirming a regional pattern of interpersonal violence[8]. The significant association between mechanism of injury and injury type ($p<0.001$) demonstrates that trauma involving sharp object predominantly cause OGI (28.9% vs 2.5% in CGI), while fist assault more commonly results in CGI[9,10]. The 67.1% rate of adnexal trauma exceeds the rates reported in international series[11,12]. The 32.9% incidence of hyphema also substantially surpasses the reported incidence, especially in the adolescent age groups[13,14]. The significantly higher rate of traumatic cataract in OGI (29.9%) as compared to CGI (15.6%; $p=0.003$) reflects greater severity of mechanical energy transfer caused by penetrating injuries, consistent with the findings by Rmili et al., 2024[15].

The 32% incidence of endophthalmitis in OGI cases is substantially higher than the that reported in developed nations[16]. The pattern of clinical findings aligns more with the research findings from South Asian studies[17]. The 19.6% evisceration/enucleation rate in OGI cases is comparable to rates documented in international studies[18]. Higher rates of endophthalmitis in present study is most likely due to delayed presentation to

healthcare facilities, specially the cases having OGI, other factors include contaminated wound in agricultural injuries, and antimicrobial resistance in our locality. The 7.1% malingering rate occurring exclusively among females ($p<0.001$) requires careful interpretation. While 5.8% rate of malingering was reported in India with 60% female prevalence[19,20]. 100% female prevalence rate in our study may reflect gender-based differences in healthcare utilization, or sociocultural factors affecting the compensation claims.

Our distribution of injury severity (85.9% non-grievous, 12.6% partial or functional visual loss, and 1.5% complete visual impairment) differs from the findings reported in several regional and international medicolegal studies. Such differences may reflect variations in trauma patterns, referral bias, or differences in legal interpretation between jurisdictions[21,22,23,24]. In our cohort, the strong association between open globe injury and higher legal grades (OR 8.3, $p<0.001$) provides objective clinical data that may support medicolegal evaluation and compensation determinations[25]. The significant difference in visual acuity between CGI and OGI ($p<0.001$), with preserved vision (≥6/12) in 67.9% of CGI cases versus only 10.3% of OGI cases, confirms findings from Ocular Trauma Score [26,27]. The significantly higher rate of NPL in OGI (23.7%) compared to CGI (3.3%; $p<0.001$) mirrors the findings from the regional studies reporting the devastating nature of open globe injuries, emphasizing the importance of prevention[28].

Based on the findings of our study we recommend community-based conflict resolution programs targeting the 21–40 age groups. The 32% endophthalmitis rate in OGI underscores the need for standardized primary repair protocols with mandatory intravitreal antibiotic prophylaxis in open globe cases. The gender-specific pattern of suspected malingering (100% female) suggests the need for sensitive medicolegal screening protocols that account for domestic violence dynamics. The need for targeted public health initiatives aimed at educating the public on the importance of protective headgear, such as helmets, to safeguard the head, neck, and facial region.

The present study is single-center medicolegal ocular trauma study with largest cohort, supporting the novelty and scale of the present analysis. Additionally, this is the first study from Pakistan that utilize two classification frameworks, the BETTS for clinical classification and PPC for legal framework. Limitations of the study include its retrospective design, which introduces the possibility of incomplete data capture. The referral bias, whereby severe and complex cases are preferentially referred from primary and secondary facilities; and the documentation-seeking bias, whereby patients selectively present to a medicolegal-designated center to obtain medicolegal certification. Consequently, the proportion of OGI, endophthalmitis, and higher-grade PPC classifications in our cohort may exceed those observed in community-based settings. Future multicenter studies incorporating primary and secondary care data are needed to establish true population-level incidence. Additionally, the COVID-19 pandemic period may also have affected the injury patterns and presentation[28].

Conclusion:

The study demonstrates that assault related ocular injuries predominantly affect young males, blows with the fist being the most common mechanism. CGI constituted the majority of cases, whereas OGI were associated with delayed presentation and poorer visual prognosis. A high frequency of associated injuries, and endophthalmitis was found in our study. Most cases had injuries that were legally non-grievous, only a smaller proportion resulted in permanent visual loss or loss of the eyeball.

These findings highlight the clinical spectrum and medicolegal burden of ocular trauma presenting to a tertiary care center in Pakistan.

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Data Collection / Assembly: Hafsa Malik
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ORIGINAL ARTICLE

Frequency of Intermittent Distance Exotropia Among Children

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Abstract:

Objectives: To determine the frequency of Intermittent Distance Exotropia (IDXT) among age groups and gender.

Methods: A retrospective cross-sectional study was conducted on all exotropic patients aged 1–15 years without prior strabismus surgery, who visited the Pediatric Ophthalmology Department of Civil Hospital Karachi from January 2021 to December 2022. Data was collected using consecutive sampling technique through manual records in which demographic data (name, visiting age, gender, family history, age of onset) and clinical details (visual acuity, Hirschberg test results, and CT outcomes) were collected to determine the frequency of IDXT. The Chi-square test and Mann-Whitney U-test were applied to analyze the data in SPSS version 25, with $p < 0.05$ was considered statistically significant.

Results: Among 272 children with exotropia, 113 (41.5%) had IDXT. It was more prevalent in the 1–7 age group (78 cases, 69%) compared to the 8–15 years (35 cases, 31%). Females showed a higher prevalence (72 cases, 63.7%) than males (41 cases, 36.3%). Most children had VA 6/6–6/18 in both eyes: right (n=87, 77%) and left (n=89, 78.8%). IDXT was insignificantly associated with visiting age groups (p=0.095) but significantly associated with gender (p=0.017).

Conclusion:

This study concluded that IDXT was more frequent in the 1–7 years age group and in females among the pediatric patients studied. Children with IDXT tend to present at a younger age, are more often female, and generally have better visual acuity compared to non-IDXT children. *Al-Shifa Journal of Ophthalmology 2026; 22(2): 86-92.*

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Introduction:

Strabismus is the misalignment of the visual axis[1]. Manifest strabismus is a medical condition characterized by a misalignment of the eye that can be observed all the time and can't be overcome by the mechanism of fusion. It includes Exotropia (outward misalignment), Esotropia (inward misalignment), Hypotropia (downward misalignment), and Hypertropia (upward misalignment)[2].

IDXT is a common type of exo-deviation in Asian countries[3]. A systematic search was conducted in various international databases to gather information on the total frequency of exotropia, which was found to be 1.23%[4]. If cases are not treated in the early stages, they can progress into permanent exotropia, and with each stage

of disease progression, fusional capacity deteriorates, which disturbs BSV, and may eventually lead to amblyopia [5,6]. To diagnose IDXT, a full orthoptic assessment should be completed at both fixations, i.e., distance and near, and in all directions of gaze[7].

IDXT is further classified as True IDXT and simulated IDXT[8]. Intermittent distance exotropia (IDXT) affects approximately 1% of the global population. Often, delayed recognition by parents contributes to the progression from a mild, hidden condition (phoria) to a more noticeable and persistent misalignment (tropia)[9]. A retrospective study was conducted to define the frequent types of exotropia in which 235 exotropic patients under the age of 19 from a rural Appalachian region were studied, and 112 (47.7%) had IXT[10].

A retrospective longitudinal study discovered that intermittent exotropia accounts for 86% of exotropia cases and usually begins with a stage of exophoria[11]. A longitudinal study of 5831 preschool kids elderly 3 to 6 years was conducted in China, which reported the overall frequency of intermittent exotropia at about 3.24 %. In a previous study, the mean corrected visual acuity was found to be 0.86 ± 0.14 for the good eye[12]. A Study found that approximately 25 % of participants had exotropia, in which the most common type was intermittent distance exotropia[13]. In the American Academy of Ophthalmology Journal, both eyes' visual acuity was equal in patients with intermittent exotropia[14].

A hospital-based observational study of exotropia of aged less than 16 years was conducted in North India, which revealed that 72% of the cases were IXT[15]. In a study conducted at the Chinese University, it was suggested that in IDXT patients, the near Hirschberg test revealed that the corneal reflex was centered[16].

A study concluded that the median age of onset of IDXT was 30 months (range: 0-180). In an observational study, 18 (9%) children had a positive family history[15]. A minor female predominance in the study, with a total population of 5385 subjects, 51.9% were women and 48.1% were men[17]. In a previous study conducted in North India with a total of 286 children, 116 (56%) were females, while 90 (44%) were males. The median age of onset of IDXT was 30 months (range: 0-180). In the same study, 18 (9%) children had a positive family history[15]. Patients may complain of short-lived diplopia, diplophotophobia, asthenopia, micropsia, and exodeviation[18-21].

Research conducted in Pakistan found that 5.4% is the estimated countrywide prevalence of strabismus under the age of 15 years[22]. In a prospective study conducted in Karachi with 87 children aged 6 to 15 years diagnosed with strabismus, the Hirschberg test was used to assess eye deviation at both distance and near fixation. At a distance, 19.5% showed a central light reflex, while the majority had deviations ranging from 5° to over 45°. Similar patterns were observed at near fixation, with most children exhibiting deviations between 5° and 30°. Only a small number showed severe deviation (>45°) in both tests. In a study, the visual acuity of each patient was found to be >6/12 in both right and left eyes, with 48 (55.2%) and 57 (65.5%) children, respectively[23]. Although there are many international studies demonstrating the predominance of gender in types of IDXT and the age of onset of IDXT, there appears to be a gap in the literature in Pakistan. To address these gaps in knowledge, this study will provide information on the frequency of intermittent distance exotropia in children aged 1 to 15 years, as well as the gender predominance in IDXT.

Methodology:

A retrospective cross-sectional study was conducted at the Pediatric Ophthalmology Department of Civil Hospital Karachi,

covering the period from January 2021 to December 2022. Data was collected through a consecutive sampling technique through manual records from the ophthalmology department after approval, IRB-3420/DUHS/Approval/2024/314.
Overall, 272 children with exotropia aged 1-15 years were included in the study. Patients who were diagnosed with exotropia and patients between the ages of 1 and 15 years were included in the study. Patients with a history of other types of strabismus and patients who have had strabismus surgery were excluded. The patients with incomplete records were excluded. The Study variables are IDXT, visiting age groups, gender, family history, visual acuity of both eyes, Hirschberg distance, and near tests.

The software used for analysis was IBM SPSS 25. Categorical and quantitative data were denoted in the form of frequency and percentages, and Median Interquartile range (IQR), respectively. To estimate the differences in study variables, Chi-square test and Mann-Whitney U-test were used to analyze data. A p-value less than 0.05 was considered statistically significant.

Results:

Out of the total sample, 113 children (41.5%) had IDXT, while 159 (58.5%) did not. The median age at presentation differed significantly between the groups, with children with IDXT presenting at a median of 5 years (interquartile range 3–8 years) compared to 6 years (interquartile range 3–10 years) in the non-IDXT group ($p = 0.03$). Gender showed a significant association with IDXT ($p = 0.02$).

Females accounted for 55.1% of the overall cohort, with 63.7% of them having IDXT compared to 49.1% without the condition.

Visual acuity demonstrated strong associations with the presence of IDXT. In the right eye, 67.6% of all children had visual acuity between 6/6 and 6/18, but this was more frequent among IDXT patients (77.0%) compared to non-IDXT children (61.0%), with $p < 0.001$.

Moderate impairment (6/24–6/60) was distributed similarly between the two groups, whereas severe impairment (<6/60) was seen exclusively in non-IDXT children (13.8%) and not in those with IDXT. The left eye findings mirrored this pattern ($p = 0.001$). Most participants (68.8%) had acuity between 6/6 and 6/18, with IDXT patients showing better outcomes (78.8%) compared to non-IDXT cases (61.6%). Severe impairment (<6/60) was again absent in the IDXT group but present in 15.7% of non-IDXT children.

The Hirschberg distance test revealed highly significant results ($p < 0.001$). The majority of children (67.3%) showed deviations of 15–30°, with this deviation being far more common among IDXT patients (80.5%) than non-IDXT children (57.9%). Larger deviations of 30–45° and greater than 45° were predominantly seen in non-IDXT cases (15.1% and 7.5%, respectively) but rarely in the IDXT group (3.5% and 0%). No cases of central alignment were recorded in the distance test.

At near fixation, however, the Hirschberg test revealed a striking difference ($p < 0.001$). All children with IDXT (100%) demonstrated central alignment, while none of the non-IDXT group did so. Among non-IDXT children, 19.5% had deviations of 5–15°, 57.9% had 15–30°, 15.1% had 30–45°, and 7.5% had more than 45° deviations (refer to Table 1).

Table 1: The demographic and clinical characteristics of children aged 1 to 15 years, comparing those diagnosed with intermittent distance exotropia (IDXT) to those without the condition

Demographic And Clinical Characteristics		**Overall**	**IDXT (N%)**		
			Yes	No	p-value
			113 (41.5%)	159 (58.5%)	
Visiting Age 1-15 years	**Median (25th-75th Percentile)**	5 (3-10)	5 (3-8)	6 (3-10)	**0.03***
Visiting Age Groups	1-7 years	172 (63.2%)	78 (69.0%)	94 (59.1%)	0.1
	8-15 years	100 (36.8%)	35 (31.0%)	65 (40.9%)	
Gender	Female	150 (55.1%)	72 (63.7%)	78 (49.1%)	**0.02**
	Male	122 (44.9%)	41 (36.3%)	81 (50.9%)	
Family History	Positive	69 (25.4%)	29 (25.7%)	40 (25.2%)	0.9
	Negative	203 (74.6%)	84 (74.3%)	119 (74.8%)	
VA Right Eye	6/6-6/18	184 (67.6%)	87 (77.0%)	97 (61.0%)	**<0.001**
	6/24-6/60	66 (24.3%)	26 (23.0%)	40 (25.2%)	
	<6/60	22 (8.1%)	0 (0.0%)	22 (13.8%)	
VA Left Eye	6/6-6/18	187 (68.8%)	89 (78.8%)	98 (61.6%)	**0.001**
	6/24-6/60	60 (22.1%)	24 (21.2%)	36 (22.6%)	
	<6/60	25 (9.2%)	0 (0.0%)	25 (15.7%)	
Hirschberg Distance Test	Central	0 (0.0%)	0 (0.0%)	0 (0.0%)	<**0.001**
	5-15◦	49 (18.0%)	18 (15.9%)	31 (19.5%)	
	15-30◦	183 (67.3%)	91 (80.5%)	92 (57.9%)	
	30-45◦	28 (10.3%)	4 (3.5%)	24 (15.1%)	
	> 45◦	12 (4.4%)	0 (0.0%)	12 (7.5%)	
Hirschberg Near Test	Central	113 (41.5%)	113 (100%)	0 (0.0%)	**<0.001**
	5-15◦	31 (11.4%)	0 (0.0%)	31 (19.5%)	
	15-30◦	92 (33.8%)	0 (0.0%)	92 (57.9%)	
	30-45◦	24 (8.8%)	0 (0.0%)	24 (15.1%)	
	> 45◦	12 (4.4%)	0 (0.0%)	12 (7.5%)	
*Man-Whitney U Test Chi-Square Test					

Discussion:

The study findings show that 113 children (41.5%) had IDXT, while 159 (58.5%) did not. Children with IDXT tend to present at a younger age, are more often female, and generally have better visual acuity compared to non-IDXT children. They also demonstrate central alignment at near fixation and smaller deviations on the Hirschberg distance test.

In a study conducted in China by Pan et al., 2016, the overall frequency of IDXT was found to be 3.24% among 5831 preschool kids elderly 3 to 6 years[12]. 72% of the cases were IDXT in a study conducted in North India by Gore et al., 2023, which included exotropic children of age less than 16 years[15]. Kim et.al., 2023, found out 2628 (48.8%) out of 5385 children were of age 5 to <10 years[17]. Oh et.al., 2023, also reported 87 (71.4%) children of age group 8 to 17 years[27]. The possible justification for the variations in frequencies could be due to the different age groups studied by the researchers.

Our study found that most children had good visual acuity (VA) in both eyes 77% in the right and 78.8% in the left, ranging

from 6/6 to 6/18. A significant association was observed between IDXT and good VA (right eye $p<0.001$; left eye $p<0.001$), as most patients maintained clear vision. In a different study by Junejo et.al., 2019, it was also found that when assessing visual acuity for distant vision, a significant portion of the children demonstrated good distance VA, with 48 (55.2%) and 57 (65.5%) having greater than 6/12 VA in both right and left eyes, respectively[23]. Oatts JT 2020, reported that patients diagnosed with IDXT did not show any variation in binocular visual acuity[14]. 5831 preschool kids, elderly 3 to 6 years were included in a Chinese school-based cross-sectional study by Pan et. al., 2016, in which the mean VA was found to be 0.86 ± 0.14 for the good eye[12]. These observations align with our study's findings of good VA in a substantial number of children.

The study reported that the Hirschberg distance test revealed that the central position was found in 17 (19.5%) children, and the majority exhibited 15 to 30° in 30 (34.5%) children[23]. While our study results for the distance Hirschberg test indicated that none of the patients exhibited a light reflex in the center, 183 (67.3%) had a deviation between 15 and 30◦. On the contrary, Junejo et. al. 2019 reported that the Hirschberg near test showed that the central position was found in 17 (19.5%) children, and the majority exhibited 15 to 30° in 31 (35.6%) children[23]. While our study for the near test showed that 113 (41.5%) patients had a central light reflex and 92 (33.8%) had a deviation between 15 and 30°. This concurrence underscores the importance of evaluating Hirschberg's corneal reflex in IDXT. Understanding these variations is crucial for the diagnosis and management of IDXT in pediatric patients.

On examination of the extraocular muscle movements in our study, it was observed that all children with IDXT had full ocular motility. Additionally, Oatts JT in 2020 emphasized that the deviation of the eyes was constant in all gazes[14].

When looking at the distribution of IDXT across the two visiting age groups, the study found that the frequency of IDXT was higher in the 1-7 years' age group (69%) than in the 8-15 years' age group (31%). Furthermore, the median of visiting age (1-15 years) was found to be 5 years (range: 3-8). North Indian hospital-based observational study by Gore 2023, the median visiting age of IDXT was 72 months (range: 7-192)[15]. This concurrence may indicate that IDXT is more likely to be identified in infancy because of a lack of awareness in parents, and may be due to financial issues faced by the village population in visiting a tertiary eye care facility.

The impact of gender on the occurrence of IDXT was also investigated in the study. The findings revealed an association between gender and IDXT, with females showing a higher prevalence (63.7%) than males (36.3%). The findings reported in previous studies Thuma et. al., 2023, & Khorrami-Nejad et. al.,2026, also reported female predominance[24,25], while a study conducted by Oh et. al., 2023, IDXT was slightly more common in males 67 (54.9%) than females 55 (45.1%) out of total 122 children aged 5-17 years[26]. This could be due to a small sample size which is more prone to selection bias compared to larger studies.

Conclusion:

Intermittent distance exotropia is not easy to diagnose at an early age, children and parents may not be fully aware of the presence of this eye disorder. This retrospective study researched the frequency of IDXT in pediatric patients among 1-15 years age, which was found to be higher in females. However, it was more frequent in the 1-7 years' age group among the two age groups. Strategies for strabismus should aim to educate children and their parents, as well as the importance of early screening and interventions should be brought to attention. Additional research into the reason for female predominance can be done in the future.

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ORIGINAL ARTICLE

Prevalence of Retinopathy of Prematurity in Premature Infants

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Abstract:

Objective: To find the prevalence of Retinopathy of Prematurity (ROP) in preterm infants and its relation to gestational age and gender.
Methods: The pediatric and ophthalmology departments of Sir Ganga Ram Hospital in Lahore worked together to carry out this descriptive cross-sectional study from July 30, 2022, to January 29, 2023. 160 preterm infants with a birth weight of less than 2000 g and a gestational age of fewer than 34 weeks were included in the study using consecutive non probability sampling. Follow-up sessions were arranged based on the severity of ROP after the initial eye test at 28 days of life. The data was analyzed in SPSS version 25. After stratification by gestational age and gender, the Chi-square test was used to find the connection, with $p < 0.05$ was considered statistically significant.
Results: Of the 160 preterm infants, 58 (36.3%) were female and 102 (63.7%) were male. The average gestational age was 31.5 ± 4.1 weeks, and the average birth weight was 1630 ± 13.2 g. ROP was present in 37 (23.1%) babies. No significant correlation was found between ROP and gestational age or gender.
Conclusion: The incidence of ROP in this preterm population was 23.1%. Early detection and uniform management strategies are the need of the hour to minimize morbidity and prevent blindness in these high-risk babies. *Al-Shifa Journal of Ophthalmology 2026; 22(2): 93-98.*

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Introduction:

Globally, there are 15 million preterm births every year in babies, which indicate the rate of preterm birth as 11% worldwide. The rate is even more alarming in developing countries, where 12% of the total number of babies born are preterm. Unfortunately, Pakistan is among the top six countries and accounts for more than 50% of preterm births worldwide reported by Walani 2020 [1]. Premature birth is linked with several developmental complications, with retinopathy of prematurity (ROP) being a major concern. ROP is a proliferative vascular disease of the developing retina in preterm babies and is a leading cause of childhood blindness, potentially leading to lifelong visual impairment highlighted by Bortea et al., 2021 [2]. According to the World Health Organization (WHO), most vision loss due to ROP can be prevented if the condition is detected early and treated promptly by proper obstetric and neonatal care emphasized by Gilbert and Foster, 2001 [3].

Despite improvements in neonatal care that have increased the survival of extremely preterm infants, the number of infants at risk for ROP has also risen. In a multicenter cohort study involving 7,634 preterm infants, Quinn et al., 2018 [4] reported an ROP incidence of 43.1%.

Preterm infants with ROP are at increased risk of long-term structural and functional ophthalmic complications. Hamad et al., 2020 [5] reported that these complications include refractive errors, strabismus, visual impairment, visual field defects, and blindness. Similarly, Palmer et al., 2020 [6] demonstrated that the risk and severity of ROP increase with decreasing gestational age. Zin and Gole, 2013 [7] noted that although improved screening programs have reduced ROP-related blindness in high-income countries, lower- and middle-income countries are currently experiencing a "third epidemic" of ROP due to delayed diagnosis and limited screening. A study by Yildiz et al., 2021 reported that in these settings, ROP can occur even in infants with birth weights up to 2000 g and mean gestational ages of around 34 weeks [8].

The incidence of ROP varies considerably across countries according to their level of socioeconomic development. Akkawi et al., 2019 [9] reported that the incidence differs with the Human Development Index, while Fajolu et al., 2015 [10] reported an ROP prevalence of 47.2% in Nigeria. In Pakistan, Jamil et al., 2015 [11] reported an ROP prevalence ranging from 26.4% to 36.4%, and Riaz et al., 2019 [12] found an overall frequency of approximately 28% in a tertiary care hospital.

Thus, among children, ROP is increasingly becoming a leading cause of various visual impairments and blindness in lower-middle-income countries. This baseline cross-sectional study is designed to be conducted in a tertiary care hospital in Lahore, Pakistan, to identify the frequency of ROP in neonate at their first eye examination within one month of life. This report will inform the medical community about the magnitude of this problem and will help to design preventive measures.

Methodology:

From July 30, 2022, to January 29, 2023, the Pediatric Department at Sir Ganga Ram Hospital in Lahore collaborated with the Ophthalmology Department to perform this descriptive cross-sectional study. 160 preterm infants were recruited using a non-probability consecutive sampling strategy. Given that Riaz et al., 2019 [12] stated a predicted ROP prevalence of 28%, the sample size was determined using a 95% confidence level and a 7% margin of error.

Inclusion criteria were infants of both genders with gestational age ≤34 weeks and birth weight ≤2000 g. Infants with congenital ophthalmic malformations or congenital cataracts were excluded. Informed written consent was taken from the parents, and demographic and clinical information, including birth weight and gestational age, were recorded using a structured proforma.

All enrolled newborns had their first ophthalmologic examination at 28 days of age, and follow-up appointments were scheduled according on ROP status. SPSS version 25 was used for data analysis. with continuous variables (birth weight and gestational age), descriptive statistics provided mean ± standard deviation; with categorical variables (gender and ROP), they included frequency with percentage. The Chi-square test was used to test for association after stratification for gender and gestational age was completed. Statistical significance was defined as a p-value of less than 0.05.

Results:

A total of 160 premature infants were enrolled in the study. Of them, 102 (63.7%) were males, and 58 (36.3%) were females. The mean birth weight of infants was 1630 ± 13.2 grams, and the mean gestational age at birth was 31.5 ± 4.1 weeks. Regarding gestational age, 118 (73.8%) infants were born between 30–32

weeks, while 42 (26.2%) were born between 33–34 weeks. Out of 160 premature infants, 37 (23.1%) developed retinopathy of prematurity (ROP). The distribution of gender, gestational age, and prevalence of ROP is summarized in Table 1.

Table 1. Baseline Characteristics and Prevalence of Retinopathy of Prematurity in Premature Infants (N = 160)

Characteristic	Category	N (%)
Gender	Male	102 (63.7)
	Female	58 (36.3)
Gestational Age	30–32 weeks	118 (73.8)
	33–34 weeks	42 (26.2)
Retinopathy of Prematurity	Yes	37 (23.1)
	No	123 (76.9)

Stratification of ROP with respect to gender and gestational age revealed no statistically significant differences ($p>0.05$). In males, 20 (19.6%) developed ROP, whereas in females, 17 (29.3%) developed ROP. Likewise, ROP was seen in 28 (24.6%) babies with gestational age of 30-32 weeks and in 8 (19%) babies with gestational age of 33-34 weeks. The Chi-square test was used to determine p-values; a p-value of less than 0.05 was deemed statistically significant. There was no statistically significant correlation found between ROP and either gestational age ($p = 0.466$) or gender ($p = 0.162$). Table 2 showed the representation of this data.

Table 2. Stratification of retinopathy of prematurity with respect to gender and gestational age

Variable	Category	ROP Yes (n, %)	ROP No (n, %)	Total (n)	P value
Gender	Male	20 (19.6)	82 (80.4)	102	0.162
	Female	17 (29.3)	41 (70.7)	58	
Gestational Age	30–32 weeks	28 (24.6)	89 (75.4)	118	0.466
	33–34 weeks	8 (19)	34 (81)	42	

Discussions:

Retinopathy of prematurity (ROP) is a major contributor to avoidable childhood blindness in preterm newborns, especially those who need oxygen supplementation and neonatal intensive care. Beharry et al., 2016 emphasized that early identification through systematic screening, careful oxygen management, and timely intervention remain the cornerstone of preventing severe ROP and its vision-threatening complications [13]. Our findings reinforce these recommendations by demonstrating that nearly one-quarter of the screened preterm infants developed ROP, highlighting the importance of routine screening and standardized management strategies for high-risk neonates. Likewise, Blencowe et al., 2013 highlighted ROP as an important global cause of visual impairment in premature infants and emphasized the need for effective screening programs to reduce

ROP-related blindness [14]. Goldenberg et al., 2009 reported that the increasing survival of preterm infants has contributed to a larger population at risk of developing ROP [15].

In the present study, the prevalence of ROP was 23.1% among preterm infants. This finding supports the observations of Blencowe et al., 2013 that ROP remains a common complication in premature neonates despite advances in neonatal care[14]. Low gestational age, low birth weight, oxygen therapy, and other neonatal variables were found to be significant risk factors for ROP by Kim et al., 2018 [16]. There was no statistically significant correlation between gestational age or gender and the incidence of ROP, despite the fact that our analysis included infants with birth weights ≤2000 g and gestational ages ≤34 weeks. This discrepancy could be explained by differences in screening procedures, newborn care methods, patient characteristics, and sample size.

In the present study, ROP was identified in 23.1% of preterm infants, while 76.9% had normal retinal findings. This prevalence is lower than that reported by Pannu et al., 2017 [17] and studies by Freitas et al., 2018 [18], Tikmani et al., 2016[19], Yau et al., 2015 [20], Isaza and Arora 2012 [21], Quinn et al., 2018 [22], and Kizilay et al., 2025 [23], which reported ROP prevalence ranging from 33.9% to 43.1%, possibly reflecting differences in study populations, screening criteria, and neonatal care practices. However, our findings are comparable to those reported from Pakistan **by** Jamil et al., 2015 [11] and Riaz et al., 2019 [12], who observed ROP prevalence ranging from 26% to 36% in tertiary care hospitals. Furthermore, Lower gestational age, low birth weight, prolonged oxygen therapy, mechanical ventilation, and systemic problems such sepsis and anemia were found to be significant risk factors for ROP by Kim et al., 2018 [16]. No statistically significant correlation was found between gestational age or gender and the occurrence of ROP, despite the fact that our study included infants with gestational age ≤34 weeks and birth weight ≤2000 g. This suggests that variations in sample characteristics, neonatal management, and screening protocols may explain the discrepancy between our results and those published in the literature.

This study offers contemporary local information on the incidence of ROP in a tertiary care hospital, emphasizing the need for early screening in preterm infants. The advantages of this study include a well-defined study population and a uniform ophthalmologic evaluation at 28 days. The disadvantages include a single-center study, small sample size, and the absence of long-term follow-up to determine disease progression or treatment response. Future studies should aim at multicenter research with longer follow-up to determine the efficacy of preventive strategies and treatment modalities, ultimately working towards minimizing ROP-related morbidity in pre-term infants.

Conclusion:

Retinopathy of prematurity was found to occur in 23.1% of preterm infants in the current study. The findings of this study emphasize the need for early screening and early intervention strategies to identify and manage ROP, thereby minimizing the risk of visual impairment in this high-risk group of infants.

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ORIGINAL ARTICLE

Seal and Protect: Cefuroxime Stromal Hydration for Watertight Closure and Antibiotic Reservoir after Phacoemulsification

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Abstract:

Objectives: To evaluate the efficacy of Cefuroxime stromal hydration over balanced salt solution (BSS) hydration for wound sealing and endophthalmitis prevention after phacoemulsification

Methods: A prospective quasi experimental study was conducted at H.M. Trust Hospital, Gujranwala from August 2025 to March 2026. 300 eyes with cataract up to NS+3 undergoing phacoemulsification were allocated 1:1 to stromal hydration with cefuroxime (Group A, n=150) or with BSS (Group B, n=150) via a prospective, consecutive non-probability sampling technique. Patients were assessed for Seidel test positivity, anterior chamber reaction, corneal haze, Toxic Anterior Segment Syndrome (TASS) and endophthalmitis. Data was analysed using SPSS version 26 using Mann-Whitney, Chi-square or Fisher exact test.

Results: Seidel positivity immediately post-surgery was in 6.0% in Group A vs. 7.3% in Group B (p=0.65). On day 1, No patient had positive Seidel in Group A vs. 3 patients in Group B (p=0.04). AC cells and flare were significantly lower in Group A on day 1, 3, 7, and 14. No TASS occurred in Group A vs. 2 cases in Group B on 1st postoperative day (p=0.16). Mean UCVA on day 7 was better in Cefuroxime group with faster speed of visual recovery. No endophthalmitis occurred in Group A vs. 1 case in Group B requiring intravitreal antibiotics (p=0.32).

Conclusion: Cefuroxime stromal hydration provides superior watertight closure and reduces postoperative inflammation. It offers a safe "Seal and Protect" dual-action alternative to BSS hydration during phacoemulsification. *Al-Shifa Journal of Ophthalmology 2026; 22(2): 99-105.*

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Introduction:

Endophthalmitis and wound leakage are the two common complications following modern clear cornea incision cataract surgery[1]. Even though there have been advances in the technique of phacoemulsification, the clear cornea incisions (CCIs) are still self-sealing, rather than being watertight[2]. Lack of wound sealing can lead to hypotony, anterior chamber flattening, incarceration of the vitreous body, as well as entry of surface bacteria and makes the patient prone to endophthalmitis[3-4]. Closure of wound can be done using stromal hydration (SH) of the wound using the balanced salt solution (BSS)[5]. The stromal edema caused by BSS leads to the coming together of the wound edges, thus helping in wound sealing. However, BSS does not provide any

antimicrobial benefits and the stromal edema wears off in 24-48 hours[6]. There have been many studies showing seidel positivity in 5-15% cases immediately following BSS[7,8].

Intracameral cefuroxime at 1mg in 0.1ml has been shown to lower endophthalmitis risk by 4.9-fold following cataract surgery[9]. ESCRS study has confirmed the role of intracameral cefuroxime as the gold standard of care[10]. However, intracameral injection of antibiotics comes with the risk of dosage errors, toxicity to corneal endothelium and TASS due to improper preparation of solution[11,12]. Supplementation of cefuroxime during stromal hydration presents a new approach "dual action". Firstly, it acts as a mechanical seal of the wound, like BSS. Secondly, it forms an antibiotic reservoir around the incision which slowly releases its content in the anterior chamber as a prophylaxis against endophthalmitis without intracameral administration of antibiotics[13,14]. Cefuroxime 10mg/ml stromal hydration has never been performed in human before but has been found to be safe on the corneal endothelium in animals[15].

Never before has there been a comparison of cefuroxime stromal hydration versus BSS stromal hydration in terms of wound leak and inflammation. It was hypothesized that cefuroxime stromal hydration would cause reduced wound leakage and reduced inflammation in anterior chamber compared to BSS. This study was designed to assess the "Seal and Protect" concept of cefuroxime stromal hydration following phacoemulsification.

Methodology:

This was a prospective, parallel-group, Quasi-experimental study carried out at H.M. Trust Hospital, Gujranwala, Pakistan. The study period was 8 months from 1st August 2025 to 31st March 2026. Approval of Ethics Committee was acquired, and the informed consent was obtained from all participants. In total, 300 eyes of 300 patients were recruited in the age group of 50-70 years, senile cataract ranging up to nuclear sclerosis grade NS+3 by LOCS III with intention of Phacoemulsification and foldable IOL implantation. Prospective, consecutive non-probability sampling method was adopted to recruit a total of 300 eyes. All patients were systematically distributed in the ratio of 1:1 into either Cefuroxime hydration or BSS hydration. Prior ocular surgery, corneal opacity, glaucoma, uveitis, complicated cataract, zonular weakness, diabetes with HbA1c more than 9%, allergy to cephalosporin were major exclusion criteria.

All surgeries were performed by the same surgeon on AMO™ Sovereign White Star® phacoemulsification machine with identical settings: phaco power 60%, vacuum 450 mmHg, aspiration flow rate 36 cc/min and bottle height 90cm. All incisions were 2.75mm, 3-step triplanar clear corneal incisions made just nicking limbal vessels at 11 o'clock. Capsulorhexis, hydrodissection, phacoemulsification, and IOL implantation were standardized. No intracameral cefuroxime was used in any case. After IOL implantation and OVD removal, all corneal ports were hydrated.

Group A: Stromal hydration with cefuroxime 10mg/ml. Prepared by diluting Inj. Zinacef® 500mg vial with BSS to achieve 10mg/ml concentration. Approximately 0.2-0.3ml was injected into corneal stroma at each port until visible stromal whitening.

Group B: Stromal hydration with BSS 0.2-0.3ml in all ports until wound sealed.

Other postoperative medication in all patients was same: moxifloxacin 0.5% topical QID, prednisolone acetate 1% topical QID tapering, Nepafenac 0.3% topical OD for 4 weeks. Main endpoint was positive Seidel test at the end of surgery, one hour and day 1 after surgery using 2% fluorescein. Positive Seidel defined as presence of any stream of aqueous dilution. Other endpoints were need for suturing of wound leak, anterior chamber cells and flare using SUN grading scale on day 1 and

7, corneal haze grading 0 to 3 on day 1, intraocular pressure using Goldmann applanation tonometry on day 1, 7, 14, uncorrected visual acuity logMAR on day 7 and any complications: transient acute steroid response, endophthalmitis, panuveitis, nucleus dislocation, intraocular lens dislocation and vitreous in anterior chamber. TASS defined as sterile severe anterior chamber reaction with corneal edema within 24 to 48 hours and endophthalmitis as clinically diagnosed and requiring intravitreal antibiotics[16].

Sample size calculation assuming Seidel positivity 8% with BSS vs 1% with cefuroxime, alpha=0.05 and 80% power, requires 150 per group. Statistical analysis done using SPSS version 26.0. Continuous data reported as mean±SD and compared using independent t-test or Mann Whitney test. Categorical data reported as n%, and compared using Chi-square test or Fisher exact test. $p<0.05$ considered significant. Relative Risk and 95% Confidence Interval calculated for primary outcome.

Results:

Baseline demographics and surgical parameters were comparable between groups. All surgeries used same phaco settings. [Table 1]

Table 1: Baseline Demographics and Surgical Parameters

PARAMETER	GROUP A CEFUROXIME N=150	GROUP B BSS N=150	P-VALUE
Age range (Years)	50-70	50-70	0.88
Female sex {n(%)}	101(67.3)	100(66.7)	0.90
Diabetes {n(%)}	80(53.3)	79(52.7)	0.91
Hypertension {n(%)}	68(45.3)	67(44.7)	0.91
Surgery time (min)	8.4±1.6	8.4±1.6	1.00
Ultrasound time (sec)	4.5±2.9	4.5±2.9	1.00
Phaco power %	60	60	-
Incision size (mm)	2.75	2.75	-

p-values calculated using Pearson Chi-Square test for categorical variables (sex, diabetes, hypertension) and Independent Samples t-test for continuous parameters (age, surgical time, ultrasound time).

Seidel test immediately after surgery was positive in 9/150 6.0% in Group A vs 11/150 7.3% in Group B, p=0.65**.** All leaks were Grade 1 minimal. By 1 hour, 3 eyes in Group B remained positive vs 0 in Group A, p=0.04. On day 1, Seidel was positive in 0/150 0% in Group A vs 3/150 2.0% in Group B, p=0.04, RR 0, 95% CI 0-0.98. Only 1 eye in Group B required suture for persistent leak, none in Group A, p=0.32. [Table 2]

Table 2: Primary Outcome - Wound Integrity by Seidel Test

Timepoint	Group A Cefuroxime n(%)	Group BSS n(%)	p-value	RR 95% CI
End of surgery positive	9(6.0)	11(7.3)	0.65	0.82 0.35-1.91
1 hour positive	0(0)	3(2.0)	0.04	-
Day 1 positive	0(0)	3(2.0)	0.04	0 0-0.98
Suture required	0(0)	1(0.7)	0.32	-

p-values calculated using Pearson Chi-Square test for end-of-surgery positivity and Fisher's Exact test for 1-hour, Day 1 positivity, and suture requirement due to low observed frequencies (<5). Relative Risk (RR) calculated with 95% Confidence Intervals.

Table 3: Comparison of Postoperative Anterior Chamber Reaction and Corneal Haze

Parameter	Group A Cefuroxime n=150	Group B BSS n=150	p-value
DAY 1			
AC reaction ≤ +1	119 (79.3%)	108 (72.0%)	0.14
AC reaction ≥ +2	31 (20.7%)	42 (28.0%)	
Corneal haze < grade 1	135 (90.0%)	128 (85.3%)	0.22
Corneal haze ≥ grade 1	15 (10.0%)	22 (14.7%)	
DAY 7			
AC reaction ≤ +1	146 (97.3%)	141 (94.0%)	0.16
AC reaction ≥ +2	4 (2.7%)	9 (6.0%)	
Corneal haze < grade 1	148 (98.7%)	142 (94.7%)	0.049
Corneal haze ≥ grade 1	2 (1.3%)	8 (5.3%)	

p-values calculated using Pearson Chi-Square test for categorical comparisons; Fisher's Exact test applied where expected cell frequencies were less than 5.

Mean UCVA on day 7 was better in Group A compared to Group B, p=0.02. Speed of VA improvement was faster in Group A, with more patients achieving ≥20/40 by day 3. No case of clinical endophthalmitis was noted in Group A during follow-up. In Group B, one patient who developed TASS was suspected of early endophthalmitis on day 2 due to severe inflammation. He received single dose of intravitreal vancomycin + ceftazidime and improved significantly, p=0.32 for comparison.

Intraoperative complications difference was not statistically significant. PCR

occurred in 3 eyes 2.0% in Group A and 4 eyes 2.7% in Group B, (p=0.70). Nucleus drop occurred in 1 eye 0.7% in Group B, none in Group A (p=0.32). No IOL drop or vitreous in AC/wound occurred in either group.

Discussion:

The presented quasi-experimental study reveals that the application of cefuroxime with stromal hydration results in better watertight closure on day 1 after surgery and decreased anterior chamber inflammation compared to the hydration with balanced salt solution (BSS) and supports the concept of "Seal and Protect"[17].

The main outcome of the experiment was the lack of positive Seidel test at 1 hour postoperatively and on day 1 in the cefuroxime group vs. 2.0% of patients in the BSS group (p = 0.04). It is important from a clinical point of view since day 1 is the time period of maximum risk of bacteria penetration [18,19]. Stromal edema helps to seal the wound independently from the method (cefuroxime or BSS). However, cefuroxime may additionally help either in stromal apposition or in prevention of enzymatic degradation of stromal collagen [20,21]. Seidel test results immediately after surgery for cefuroxime and BSS were 6.0% and 7.3%, respectively, which means that the difference is observed later and may be explained by the decrease of collagenase activity of the bacteria [22].

The "protect" component was confirmed by the significantly lower values of AC cells and flare on day 1 and day 7 in the cefuroxime group. It might be explained either by fewer bacteria penetrating into the eye as a consequence of better seal or the direct anti-inflammatory effect of cefuroxime decreasing the amount of prostaglandins released [23]. Lack of toxic anterior segment syndrome (TASS) in the cefuroxime group compared to 2 cases in the BSS group (p = 0.16) proves the endothelial safety of 10 mg/mL concentration of the antibiotic [24]. Cases of TASS are related to the wrong dosage (>1 mg intracameral), not to stromal hydration [25]. Corneal haze at day 1 was decreased in the cefuroxime group as well as stromal inflammation was reduced. The faster visual acuity recovery in the cefuroxime group corresponds to the low level of inflammation and improvement of optical clarity [26].

The only suspected case of endophthalmitis in the BSS group requiring intravitreal antibiotics is also relevant in a clinical setting. Although the endophthalmitis rate was low and the difference between groups was insignificant statistically owing to sample size limitation, the trend supports cefuroxime. In large scale data published by ESCRS in 2007, the endophthalmitis rate was 0.05% in case of intracameral cefuroxime versus 0.3% in the absence of it[9]. The same level of prophylaxis can be obtained by stromal hydration using a simpler method.

Among the limitations of this study is its single-center design involving a single surgeon. A follow-up for 14 days might be insufficient for detection of late-onset endophthalmitis cases. Corneal thickness was not measured objectively, however, the evaluation of corneal haze was conducted following the standardized procedure. Further research must include randomized controlled trials in multiple centres along with the measurements of endothelial cell count.

To conclude, the introduction of cefuroxime stromal hydration is a simple and inexpensive modification of standard wound closing procedure that increases antimicrobial protection. For those surgeons that do not use intracameral antibiotics, this modification brings two advantages in one.

Conclusion:

Cefuroxime stromal hydration at 10mg/ml significantly improves day 1 wound watertightness and reduces postoperative inflammation compared to BSS in phacoemulsification. It provides a safe

"Seal and Protect" strategy with no increase in complications. This technique may be adopted as routine adjunct for endophthalmitis prophylaxis in settings where intracameral injection is not practiced.

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