EMERGENCY APPROACHES IN OCULAR EMERGENCIES

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Content

GENERAL APPROACH AND FUNDAMENTAL PRİNCİPLES İN OPHTHALMİC EMERGENCİES

ALİ HAKİM REYHAN[1]

Introduction

Ophthalmic emergencies are urgent situations that need fast medical help to avoid permanent vision loss or other issues. These emergencies include various eye problems like injuries, retinal detachments, and acute glaucoma, which can severely affect a patient's life. Quick treatment of these issues is essential since many can lead to serious complications if not addressed. For example, using point-of-care ultrasound to detect endophthalmitis has shown potential to speed up treatment for patients who were wrongly diagnosed with orbital cellulitis, highlighting the need for quick and precise

diagnostic methods (Shinde & Birru, 2024). Furthermore, a systematic approach in emergency rooms can help with referrals and increase care efficiency, as studies have shown that many emergency visits are not necessary because of poor referral details from general

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practitioners (Maria,2024). Being skilled and trained to handle these emergencies can greatly improve patient results.

A methodical way to handle eye emergencies is very important for reducing issues and improving patient results. First, it is very important to correctly assess the urgency, because misclassifying can cause delays in treatment and bad visual results. Research shows that many eye-related cases in emergency rooms are not urgent, which shows the need for good screening methods (Rossi et al, 2007) Good referrals and clear record-keeping are key to making sure patients get care that is timely and suitable. Using ocular point-of-care ultrasound (POCUS) has been helpful in quickly diagnosing issues like endophthalmitis, giving quick information that helps with urgent treatment, especially in places without eye care specialists (Plus, ongoing education and training for emergency doctors on how to handle common eye emergencies can boost their confidence and improve service quality, helping to avoid serious long-term vision problems (Maria,2024). In conclusion, understanding these ideas is crucial for good emergency eye care.

In the field of eye emergencies, it is very important to have a clear classification system for proper diagnosis and treatment. These emergencies can be categorized in different ways, including the type of injury, how urgent it is, and the underlying cause. For example, we can broadly divide them into traumatic and non-traumatic types. Traumatic conditions include things like foreign objects in the eye and scratches on the cornea. Non-traumatic cases may encompass infections such as endophthalmitis and acute glaucoma (Shinde & Birru, 2024). This classification helps emergency medical workers decide what to treat first; recent research shows that a concerning 80.9% of emergency referrals were not urgent, suggesting a possible waste of resources (Hammed et al,2023). Therefore, effectively sorting eye conditions not

only improves patient results but also makes healthcare delivery more efficient by easing unnecessary strains on emergency services. Highlighting the need for classification ensures that medical professionals are ready to tackle these varying clinical situations, which helps in maintaining vision and enhancing care quality.

1.Emergency Ophthalmologic Assessment

Ocular emergencies pose a significant challenge in clinical practice, requiring both rapid intervention and precise diagnostic expertise. Ocular complaints represent up to 3% of all emergency department visits," emphasizing the importance of adopting accurate and efficient examination techniques in high-stakes environments.The systematic evaluation of acute ophthalmologic conditions necessitates a structured and hierarchical approach that seamlessly integrates initial emergency assessment with advanced specialist care. This comprehensive protocol is divided into two interconnected phases: the critical first-line evaluation and the subsequent specialized ophthalmologic assessment. The initial emergency phase focuses on establishing fundamental parameters through vital history-taking, basic examination techniques, and essential diagnostic tests, forming the foundation of urgent ophthalmic care. Building on this, the advanced specialist evaluation incorporates sophisticated imaging modalities, detailed structural analyses, and complex therapeutic decision-making processes. By integrating these sequential levels of assessment, this approach ensures optimal patient outcomes, balancing the urgency of intervention with the need for thorough diagnostic evaluation. This systematic framework not only facilitates accurate diagnosis and timely treatment but also ensures a seamless transition between emergency care and specialized ophthalmologic management, ultimately enhancing visual outcomes in acute ocular emergencies(Evans et al.,2023)(Shahetet al,2020).

1.1.Initial Emergency Assessment (First-Line Evaluation)

1.1.1.Vital History Taking

- Onset and duration of symptoms
- Pain characteristics
- Visual changes
- Trauma history if applicable
- Systemic conditions

1.1.2.Basic Examination Steps

- Visual acuity measurement
- Basic pupillary light reflex
- Gross external examination
- Confrontation visual fields
- Basic penlight examination

1.1.3.Essential Initial Tests

- IOP measurement with tonometry
- Basic fluorescein staining
- Simple red reflex test
- Direct ophthalmoscopy
- Basic slit-lamp examination

1.1.4.Initial Documentation

- Basic visual acuity records

- Primary findings
- Initial treatment decisions
- Referral necessity assessment
- Advanced Ophthalmologist's Specialized Emergency Assessment
- Comprehensive Specialist Evaluation

1.2.Advanced Diagnostic Techniques

- Goldmann applanation tonometry
- Dynamic gonioscopy
- Detailed slit-lamp biomicroscopy
- Indirect ophthalmoscopy with scleral depression

1.2.1.Specialized Imaging

- AS-OCT for anterior segment analysis
- Posterior segment OCT
- B-scan ultrasonography

1.2.2.Detailed pupillary assessment

- Quantitative RAPD evaluation
- Pharmacologic testing

1.2.3.Specialized staining techniques

- Rose Bengal
- Lissamine green
- Corneal sensitivity testing

- Formal visual field assessment

1.2.4.Complex Decision Making andSurgical intervention assessment

- Timing determination
- Approach selection
- Risk stratification

1.2.5.Advanced medical management

- Medication interactions
- Dosing modifications
- Treatment sequencing

1.2.6.Specialized Documentation

- Digital imaging documentation
- Medical-legal consideration documentation

1.2.7.Advanced Management Planning

- Emergency surgical planning if needed
- Complex medical therapy protocols
- Interdisciplinary consultation coordination
- Long-term management strategy development

Table1. Diagnostic Techniques Usage Analysis

Technique	Description	Common Uses
Slit Lamp Examination	Direct visualization of anterior segment	Corneal injuries, anterior chamber assessment
Ophthalmoscope, Retinoscope, Fundoscopy	Examination of anterior and posterior segment	Retinal detachment, hemorrhage detection
Tonometry	Measurement of intraocular pressure	Glaucoma assessment, acute pressure changes
Gonioscopy	Examination of anterior chamber angle	Angle closure assessment
OCT	High-resolution imaging of retinal layers	Macular edema, retinal thickness measurement
B-scan Ultrasound	Posterior segment imaging through opaque media	Retinal detachment when view obscured
AS-OCT	Examination of anterior segment	Angle-Closure Glaucoma ,Corneal Emergencies

OCT; Optical coherence tomography, AS-OCT; Anterior segment optical coherence tomography

2. Diagnostic Methods and Imaging Techniques

Understanding eye emergencies is very important for quick and effective clinical response. Fast recognition and handling of these cases can greatly change patient results, as quick treatment often reduces complications that can happen from issues like blunt trauma, retinal detachment, or acute glaucoma. Doctors use different diagnostic tools, including advanced imaging methods, to evaluate and diagnose these emergencies correctly (Table1). For example, eye imaging techniques, such as optical coherence tomography and fluorescein angiography,

improve the detection of retinal problems and blood flow changes, which are important in cases of diabetic retinopathy (Mahendradas el al,2024) . Also, combining thorough clinical evaluations with imaging gives a better view of the eye's structure and problems, setting the stage for effective treatments . Thus, a unified approach that blends diagnostic skills with clinical knowledge is crucial in dealing with eye emergencies, highlighting their importance in clinical work (Cristescu et al.,2019)

2.1. Slit Lamp Examination

The slit lamp biomicroscope is a vital diagnostic instrument in ophthalmology, providing stereoscopic magnified views of the eye's anterior segment structures, including the cornea, anterior chamber, iris, and lens. Utilizing a high-intensity light source focused into a thin slit, it enables detailed visualization through various illumination techniques such as direct focal, indirect, and retroillumination. This versatility allows clinicians to systematically evaluate each layer of the cornea and anterior chamber, making it indispensable for both routine assessments and emergency care. In cases of corneal injuries, the slit lamp excels in detecting and characterizing epithelial defects, stromal infiltrates, and foreign bodies, with fluorescein staining enhancing the visibility of abrasions and ulcerations. For trauma cases, it is particularly valuable in examining the anterior chamber, revealing the presence of cells, flare, or hyphema, which indicate inflammation or hemorrhage. Additionally, the Van Herick technique performed at the slit lamp facilitates the assessment of the anterior chamber angle, critical for evaluating the risk of angle-closure glaucoma. Its ability to provide both qualitative and semi-quantitative measurements of anterior segment pathology ensures its role as an essential tool for diagnosis, treatment planning, and monitoring therapeutic responses in corneal and anterior segment disorders(Shu , Wang J, & Hu, 2019).

2.2. Ophthalmoscope, Retinoscope, Fundoscopy

2.2.1. Ophthalmoscope

The ophthalmoscope is a cornerstone diagnostic tool in emergency ophthalmology, enabling direct visualization of the posterior segment of the eye. This handheld device employs a focused beam of light and a series of lenses to illuminate and examine the retina, optic disc, and posterior pole structures. In emergency scenarios, the ophthalmoscope is indispensable for identifying sight-threatening conditions such as papilledema, which may signal increased intracranial pressure, retinal detachment requiring urgent surgical intervention, or central retinal artery occlusion necessitating immediate treatment. With approximately 15x magnification and a 5-degree field of view, the direct ophthalmoscope allows detailed examination of the optic nerve head for signs of edema, hemorrhage, or pallor. Emergency physicians rely on this instrument for rapid assessments in cases of acute vision loss, severe headaches with visual symptoms, or ocular trauma, where timely diagnosis is critical for preserving vision(Keeler, C. R).

2.2.2 Retinoscope

The retinoscope, while traditionally associated with routine refractive error evaluation, holds a distinct role in emergency ophthalmology. This specialized instrument projects a streak or spot of light into the eye, analyzing the movement of the reflected light from the retina (retinal reflex). In emergencies, the retinoscope is particularly valuable for detecting media opacities such as traumatic cataracts, vitreous hemorrhage, or corneal edema, which may obstruct clear visualization of the fundus. Its ability to assess the quality and characteristics of the red reflex makes it especially useful in pediatric emergencies, including suspected retinoblastoma or congenital

cataracts. Furthermore, in situations where conventional visual acuity testing is challenging due to patient cooperation or communication barriers, retinoscopy provides objective insights into the optical status of the eye (Corboy,2024).

2.2.3.Fundoscopy

Fundoscopy, encompassing both direct and indirect examination techniques, is a critical diagnostic approach in emergency ophthalmology. Unlike the direct ophthalmoscope, indirect fundoscopy employs a head-mounted binocular device paired with a condensing lens, offering a stereoscopic view of the retina with a significantly wider field of view (approximately 30 degrees). This broader perspective is essential in emergency settings for identifying peripheral retinal pathologies such as retinal tears, hemorrhages, or signs of infectious retinitis. The stereoscopic capability of indirect fundoscopy enhances the evaluation of elevated lesions, making it particularly effective for assessing conditions like choroidal melanomas or retinal detachments. In acute scenarios, its ability to examine the peripheral retina through small pupils and media opacities renders it indispensable for comprehensive evaluations of trauma cases, suspected endophthalmitis, or acute retinal vascular events (Driban, 2024).

2.3.Tonometry

Tonometry is a vital tool in eye care, used to measure intraocular pressure (IOP), which is essential for maintaining the health and function of the eye. This measurement is particularly important in diagnosing and managing glaucoma, a condition where elevated eye pressure can lead to optic nerve damage and vision loss if left untreated. The most widely used method, Goldmann applanation tonometry, gently flattens a small area of the cornea to determine the pressure inside the eye, providing accurate and reliable results. Modern

advancements, such as non-contact and rebound tonometry, have made the process quicker and more comfortable, especially for children or patients who may be anxious about the procedure. Beyond routine check-ups, tonometry plays a critical role in emergency situations, such as detecting acute pressure spikes in angle-closure glaucoma, which require immediate intervention to prevent permanent vision loss. By offering a simple, painless, and effective way to monitor eye pressure, tonometry helps protect vision and ensures timely treatment for a range of ocular conditions (Cook et al.2012).

2.4.Gonioscopy

Gonioscopy is a crucial diagnostic technique in ophthalmic emergencies, particularly for assessing the status of the anterior chamber angle. As the reference standard for evaluating angle closure risk, it plays a pivotal role in managing acute angle-closure glaucoma (AAG), an ocular emergency marked by a rapid rise in intraocular pressure. By enabling direct visualization of the anterior chamber angle structures, gonioscopy allows clinicians to identify anatomical variations, angle abnormalities, and potential obstructions to aqueous outflow that may trigger acute angle closure. In emergency scenarios, a prompt gonioscopic examination can detect peripheral anterior synechiae, appositional angle closure, or other pathological changes that necessitate immediate intervention. Its capacity for real-time, dynamic assessment of angle configuration is invaluable in determining the need for urgent therapeutic measures, such as laser peripheral iridotomy or medical management, to prevent irreversible optic nerve damage and vision loss (Nolan,2022).

2.5. Optical coherence tomography (OCT)

Optical Coherence Tomography (OCT) is a noninvasive imaging technology primarily used in ophthalmology to produce high-

resolution, three-dimensional cross-sectional images of the eye. It enables detailed visualization of the retina, where healthy tissue exhibits smooth, regular layers. Deviations from this structure, such as irregularities, elevations, or depressions, may indicate pathological conditions.

Quick and correct diagnosis in eye emergencies is very important to avoid serious vision loss. Important diagnostic tools include optical coherence tomography (OCT), fluorescein angiography, and ultrasonography, each having special benefits for quickly checking eye issues. For instance, OCT gives clear images of the retina and optic nerve, helping doctors see small changes that may show serious problems. On the other hand, fluorescein angiography helps check blood flow problems, like diabetic retinopathy or retinal detachment, by showing how blood moves and leaks in the retinal vessels. Recent studies show that early diagnosis and treatment of eye issues can help stop lasting vision loss (Saleh et al.,2022).

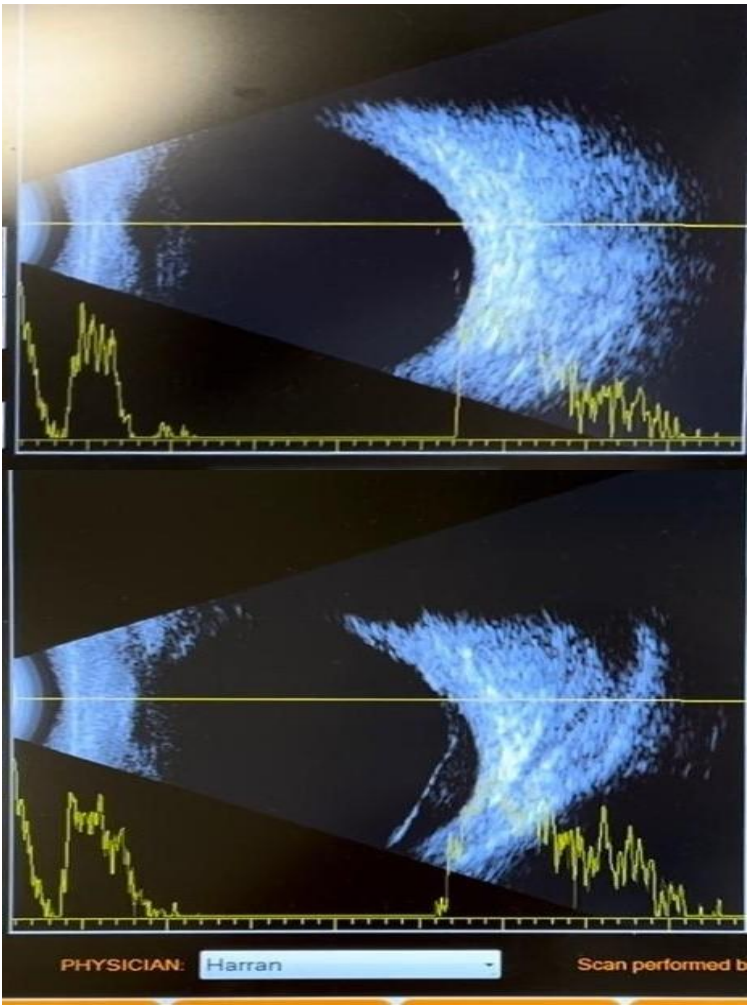
Optical Coherence Tomography (OCT) is a critical diagnostic tool in emergency settings, particularly for identifying pathologies associated with acute vision loss. It is highly effective in detecting conditions such as retinal detachment, optic nerve edema, retinal vascular occlusions, and macular problems, all of which can lead to sudden vision impairment. OCT's advantages include its ability to be used on light-sensitive patients due to its near-infrared light source, rapid imaging capabilities essential for urgent interventions, and its non-invasive nature, which ensures patient comfort. Specific applications include detailed examination of retinal layers, early detection of macular edema and retinal detachment, and evaluation of retinal and choroidal structures in cases of blurred vision. Additionally, OCT is instrumental in diagnosing vitreous detachment and retinal tears in patients reporting light flashes or floaters. By enabling the swift

identification of conditions requiring surgical or medical intervention, OCT plays a pivotal role in guiding treatment plans and determining whether vision loss is reversible. This technology provides maximum diagnostic information with minimal patient discomfort, making it indispensable in acute ophthalmic care (Lains et al.,2021).

2.6. B-scan Ultrasound

B-scan ultrasound is a diagnostic imaging technique that uses high-frequency sound waves to create two-dimensional cross-sectional images of the eye and orbit. It operates by emitting sound waves from a transducer, which penetrate ocular tissues and reflect back to the device based on the density and structure of the tissues encountered. These reflected waves are then processed to generate detailed images, making B-scan ultrasound invaluable in visualizing posterior segment structures obscured by media opacities such as dense cataracts or vitreous hemorrhage. Its significance in ophthalmology lies in its ability to detect and evaluate retinal detachments, intraocular tumors, vitreous opacities, and choroidal abnormalities (Figure 1). In emergency settings, B-scan ultrasound is particularly useful for assessing acute vision loss and ocular trauma. For instance, it can rapidly identify retinal detachments, vitreous hemorrhages, or foreign bodies in cases of trauma, guiding immediate clinical decisions. Additionally, it is a critical tool for diagnosing globe rupture or intraocular hemorrhage in patients with severe eye injuries. By providing real-time, non-invasive imaging, B-scan ultrasound plays a pivotal role in both routine ophthalmic evaluations and urgent care scenarios, ensuring timely and accurate diagnosis (Silverman et al, 2023).Figure 1:1a: Normal posterior segment architecture with appropriate vitreoretinal interface. 1b: Pathological separation of the posterior hyaloid membrane, diagnostic posterior vitreous detachment.

1a



1b

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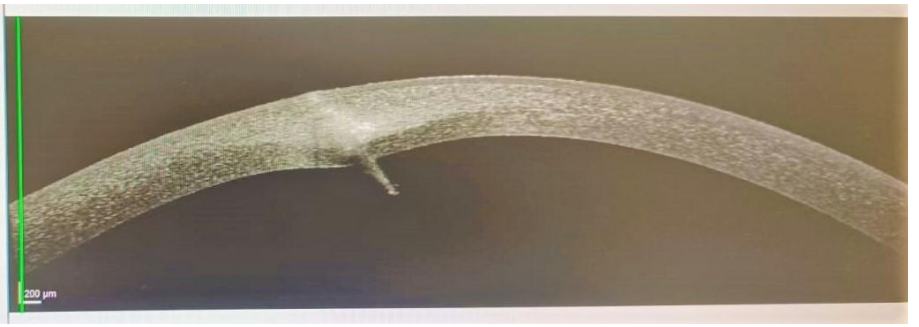
2.7. Anterior segment optical coherence tomography (AS-OCT)

Anterior segment optical coherence tomography (AS-OCT) is a transformative diagnostic tool in emergency ophthalmology, offering rapid, non-contact, and high-resolution imaging of anterior chamber structures. In acute scenarios, AS-OCT provides critical diagnostic insights through real-time, cross-sectional visualization of the cornea, anterior chamber angle, iris, and anterior lens surface. Its primary applications in emergencies include the evaluation of acute angle-closure glaucoma, where immediate assessment of angle configuration informs urgent intervention strategies; trauma cases, where it enables detailed imaging of structural damage without requiring direct contact; and corneal emergencies, offering precise measurements of corneal thickness, foreign body depth, and the extent of infections(Figure 2). The non-contact nature of AS-OCT, combined with its ability to generate quantitative measurements, makes it particularly advantageous in situations where traditional examination methods are hindered by patient discomfort or corneal opacity. By integrating AS-OCT into emergency protocols, diagnostic accuracy and treatment planning have been significantly enhanced, providing emergency physicians with a reliable method for documenting and monitoring acute anterior segment pathologies. This technology facilitates evidence-based clinical decision-making, ensuring timely and effective management of urgent ophthalmic conditions (Asam et al, 2019).

Figure 2: The Anterior Segment Optical Coherence Tomography (AS-OCT) imaging revealed a hyperreflective foreign body extending into the anterior chamber.



Source: Department of Ophthalmology Archives, Harran University School of Medicine, Turkey.

3.Principles of Initial Intervention and Emergency Protocols

When it comes to eye emergencies, every minute counts - just like how you'd rush to help someone who's hurt themselves. Think of it as having a well-rehearsed emergency plan, similar to how we know to call 112 in a crisis. Eye doctors and emergency staff follow clear, step-by-step guidelines to quickly figure out what's wrong and give the right treatment to save someone's vision. It's like having a trusted roadmap that helps medical teams work efficiently when time is precious, making sure your eyes get the care they need, when they need it most (Jeannin et al, 2016).

The systematic approach to ophthalmic emergencies necessitates a structured triage protocol that facilitates rapid assessment and appropriate intervention based on the severity and nature of ocular pathology. This comprehensive flowchart delineates a hierarchical decision-making process, beginning with initial risk assessment and progressing through three distinct priority classifications: immediate intervention (Category I), urgent intervention (Category II), and semi-urgent intervention (Category III), each with specific time-sensitive requirements for medical response. The protocol subsequently branches into specialized intervention pathways for chemical injuries, acute

angle-closure, and trauma management, incorporating standardized emergency procedures that encompass both medical management and surgical preparation protocols. This systematic framework culminates in robust documentation and communication protocols, ensuring seamless interdisciplinary coordination and comprehensive patient care documentation, thereby optimizing outcomes in acute ophthalmic emergencies while maintaining medical-legal compliance (Figure 3). Table 2 provides a comprehensive summary of ophthalmic emergencies requiring immediate intervention and their corresponding initial management protocols. A comprehensive emergency eye care protocol is presented below, encompassing a structured four-tier system of triage, immediate intervention, standardized procedures, and documentation protocols to effectively manage ophthalmic emergencies from initial assessment to follow-up care.

3.1. Emergency Triage Protocols

31.1.Initial Risk Assessment

Vision-threatening conditions identification

Pain severity evaluation

Structural integrity assessment

Neurological status evaluation

3.1.2.Priority Classification

3.1.2.1.Category I: Immediate intervention required (within minutes)

Chemical burns

Acute angle-closure glaucoma

globe rupture

3.1.2.2.Category II: Urgent intervention (within hours)

Retinal detachment

Acute iritis

Corneal ulceration

3.1.2.3.Category III: Semi-urgent (within 24 hours)

Peripheral retinal tears

Posterior vitreous detachment

Non-penetrating trauma

3.2. Immediate Intervention Protocols

3.2.1.Chemical Injury Protocol

Immediate irrigation initiation

pH measurement

Visual acuity documentation

Anterior segment evaluation

Medical therapy implementation

3.2.2.Acute Angle-Closure Protocol

IOP measurement

Medical pressure reduction

Pain management

Peripheral iridotomy preparation

Monitoring protocol implementation

3.2.3.Trauma Management Protocol

Globe protection

Tetanus prophylaxis assessment

Antibiotic administration

Imaging studies coordination

Surgical planning initiation

3.3. Standardized Emergency Procedures

3.3.1.Medical management

Evidence-based medication protocols

Route of administration selection

Doing schedules establishment

Contraindication assessment

Drug interaction evaluation

3.3.2.Surgical Preparation

Operating room notification

Equipment preparation

Consent process initiation

Team coordination

Post-operative planning

3.4. Documentation and Communication Protocols

3.4.1.Emergency Documentation

Standardized assessment forms

Imaging documentation

Intervention timing records

Communication logs

Follow-up planning

3.4.2.Interdisciplinary Communication

Emergency department coordination

Specialist consultation protocols

Transfer arrangements

Family communication guidelines

The successful management of ophthalmic emergencies depends on the systematic implementation of standardized protocols, ensuring rapid, appropriate intervention while maintaining comprehensive documentation and effective communication across the healthcare team (Joshua et al,2020).

Figure 3. Emergency Eye Care Protocol (Flow diagram)

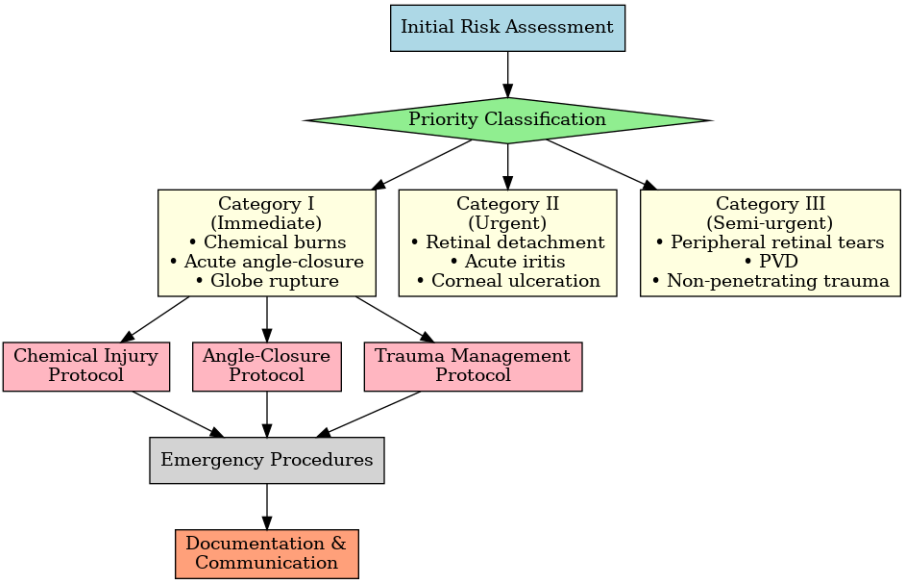


Table 2.Types of Eye Emergencies

Emergency Type	Description	First Aid/Initial Management
Chemical Burns	Exposure to acids, alkalis, or other harmful substances	Immediate irrigation with sterile saline or clean water for at least 15-30 minutes
Trauma/Foreign Body	Physical injury or foreign object in eye	Do not rub eye, shield eye if possible, seek immediate medical attention
Acute Angle-Closure Glaucoma	Sudden increase in intraocular pressure	Urgent ophthalmological referral, pain management
Retinal Detachment	Separation of retina from underlying tissue	Immediate referral to ophthalmologist, avoid strenuous activity
Corneal Ulcer	Infection or inflammation of cornea	Urgent antibiotic treatment, ophthalmological evaluation
Orbital Cellulitis	Infection of eye socket tissues	Immediate IV antibiotics, hospitalization may be required
Endophthalmitis	Severe internal eye infection	Emergency ophthalmological intervention, intravitreal antibiotics
Central Retinal Artery Occlusion	Blockage of main retinal artery	Immediate ophthalmological treatment, time-critical intervention
Acute Vision Loss	Sudden decrease or loss of vision	Emergency ophthalmological evaluation, protect eye

4. Ophthalmic Emergencies in Systemic Diseases

4.1.Introduction

Ophthalmic emergencies in systemic diseases represent a critical intersection of multisystem pathology and vision-threatening conditions that demand immediate recognition and intervention by healthcare providers. The eye, serving as an accessible extension of the central nervous system and vascular network, often manifests early signs of systemic diseases through various sight-threatening complications that require urgent attention. In the landscape of modern medicine, the increasing prevalence of systemic conditions such as diabetes mellitus, hypertension, and autoimmune disorders has led to a proportional rise in associated ophthalmic emergencies, necessitating a comprehensive understanding of their pathophysiological mechanisms and management protocols (Table3). The spectrum of these emergencies ranges from acute angle-closure glaucoma in systemic hypercoagulable states to vision-threatening retinal vasculitis in autoimmune conditions, presenting unique diagnostic and therapeutic challenges that require immediate intervention to prevent irreversible vision loss. The complexity of these cases is further amplified by the delicate balance required in managing both the underlying systemic condition and its ocular manifestations, often necessitating a coordinated multidisciplinary approach involving ophthalmologists, internists, and other specialists. Recent advances in diagnostic imaging, including optical coherence tomography angiography and ultra-widefield imaging, have revolutionized our ability to detect and monitor these conditions with unprecedented precision, enabling early intervention in vision-threatening emergencies. The management of these cases often requires a nuanced understanding of both local ocular therapeutics and systemic medications, with careful consideration of their interactions and potential complications

(Aroch,Ofri&Sutton,2009). Furthermore, the emergence of targeted biological therapies has introduced new treatment paradigms while simultaneously creating novel challenges in managing their potential ocular side effects. The time-sensitive nature of these conditions, coupled with their potential for devastating visual outcomes, underscores the critical importance of establishing standardized emergency protocols and referral networks. Finally, the ongoing evolution of telemedicine and artificial intelligence in ophthalmology presents new opportunities for early detection and management of these emergencies, particularly in resource-limited settings where access to specialized care may be challenging (Biousse,Nahab& Newman,2018).

Table 3. Common Systemic Diseases Associated with Eye Emergencies

Systemic Disease	Associated Eye Emergency	Key Clinical Features
Acquired Syphilis	Acute uveitis, interstitial keratitis, optic neuritis	Granulomatous uveitis, retinal vasculitis, pupillary abnormalities
Varicella-Zoster Virus	Herpes zoster ophthalmicus, acute retinal necrosis	Vesicular rash in V1 distribution, corneal dendritic ulcers, acute severe pain
Lyme Disease	Acute uveitis, optic neuritis, cranial nerve palsies	Conjunctivitis, Bell's palsy, retinal vasculitis with cotton wool spots
AIDS	CMV retinitis, acute retinal necrosis, infectious retinitis	Progressive vision loss, retinal white infiltrates, hemorrhages
Reiter's Syndrome	Acute anterior uveitis, severe conjunctivitis	Bilateral conjunctival injection, mucopurulent discharge, photophobia
Infectious Endocarditis	Endophthalmitis, septic retinal emboli	Roth spots, retinal hemorrhages, sudden vision loss
Kawasaki's Disease	Bilateral acute anterior uveitis, conjunctival injection	Bilateral non-exudative conjunctivitis, anterior chamber inflammation
Temporal Arteritis	Anterior ischemic optic neuropathy (AION), central retinal artery occlusion	Acute vision loss, scalp tenderness, jaw claudication
Hypertension	Hypertensive crisis with papilledema, retinal hemorrhages	Grade IV retinopathy, flame hemorrhages, cotton wool spots, disc edema
Diabetes	Proliferative diabetic retinopathy, vitreous hemorrhage	Neovascularization, preretinal hemorrhage, macular edema

4.2. Ocular Manifestations in Systemic Diseases

4.2.1.Acquired syphilis

Ocular Manifestations:

- Uveitis
- Keratitis
- Iridocyclitis
- Chorioretinitis
- Posterior uveitisVaso-occlusive retinal changes
- Retinal detachment
- Argyll Robertson pupil
- Third and sixth cranial nerve palsies
- Visual field defects

Clinical Significance:

Reversible if detected and treated earlyMore severe eye disease and higher complication rates in HIV patients

Management Approach:

- IV benzylpenicillin G 18-24 million units/day (3-4 million units q4h for 10-14 days)
- Oral prednisone 60-80mg daily for severe inflammation, taper over 2-4 weeks
- Monitor CSF and RPR titers at 3, 6, and 12 months
- Alternative: Doxycycline 100mg BID for 28 days if penicillin-allergic

- Quarterly VDRL/RPR monitoring in first year
- (Tsan & Claiborne, 2021)

4.2.2.Varicella-zoster virus infection

Ocular Manifestations:

- Lid
- Conjunctival
- Corneal vesicles
- Iridocyclitis
- Glaucoma
- Cataracts
- Chorioretinitis
- Optic neuritis or atrophy
- Internal ophthalmoplegia

Clinical Significance:

Potential for chronic ocular inflammation\nVision loss\nSevere pain

Management Approach:

Valacyclovir 1000mg TID or famciclovir 500mg TID for 7-10 days

Topical ganciclovir 0.15% gel 5x daily for dendritic keratitis

Prednisolone acetate 1% q2-3h for stromal keratitis/uveitis

IOP monitoring and management in secondary glaucoma

Prophylactic acyclovir 800mg daily for 12 months in high-risk cases (Sanjay, Huang&Lavanya, 2011)

4.2.3.Lyme disease

Ocular Manifestations:

- Conjunctivitis
- Periorbital edema
- Photophobia
- Iridocyclitis
- Retinal vasculitis
- Disc edema
- Choroiditis
- Paralytic mydriasis
- Horner's syndrome
- Argyll Robertson pupil
- Orbital myositis
- Episcleritis
- Stromal keratitis
- Vitritis
- Pars planitis

Clinical Significance:

Potential for severe ocular complications in late-stage disease

Management Approach:

IV ceftriaxone 2g daily for 14-28 days in neuro-ophthalmic cases

Oral doxycycline 100mg BID for 21-28 days in early-stage disease

Topical prednisolone acetate 1% q2-4h for anterior inflammation

Pulse methylprednisolone 1g daily for 3-5 days in severe optic neuritis

Regular visual field and OCT monitoring

(Lindström et al,2022)

4.2.4.Acquired immunodeficiency syndrome (AIDS)

Ocular Manifestations:

- Conjunctival microvascular disease
- Dry eye
- Keratoconjunctivitis sicca
- Chronic allergic conjunctivitis
- Opportunistic infections (viral\nprotozoal\nfungal)
- Kaposi's sarcoma
- Infectious keratitis
- Anterior uveitis
- Retinal microangiopathy
- Cytomegalovirus retinitis

- Retinal detachment
- Optic nerve interference

Clinical Significance:

Potential for vision impairment or blindness

Management Approach:

- Ganciclovir induction 5mg/kg q12h for 14-21 days in CMV retinitis
- Maintenance valganciclovir 900mg daily
- Intravitreal foscarnet 2.4mg/0.1mL for resistant cases
- Prophylactic valganciclovir if CD4 < 50 cells/μL
- Serial fundus photography and OCT every 4-6 weeks
- (Teoh, Ou, & Lim, 2012)

4.2.5.Reiter's syndrome

Ocular Manifestations:

- Mucopurulent conjunctivitis
- Acute iritis
- Keratitis

Clinical Significance:

- Potential for chronic recurrent ocular inflammation
- Posterior synechiae
- Glaucoma

- Cystoid macular edema
- Cataracts

Management Approach:

- Initiate NSAIDs (e.g., indomethacin, naproxen) for joint symptoms and inflammation
- Prescribe topical corticosteroids (prednisolone acetate 1%) for anterior uveitis
- Consider systemic corticosteroids for severe ocular inflammation
- Use disease-modifying antirheumatic drugs (DMARDs) like sulfasalazine or methotrexate for persistent cases
- Treat underlying infection if identified (particularly chlamydial or gastrointestinal infections)
- Monitor intraocular pressure and manage secondary glaucoma if present
- Regular slit-lamp examinations to assess anterior chamber inflammation
- Coordinate care with rheumatologist for systemic management
- (Suresh,2016)

4.2.6.Infectious endocarditis

Ocular Manifestations:

- Roth's spots

- Focal retinitis
- Embolic retinopathy
- Subretinal abscesses
- Choroidal septic metastasis
- Choroiditis
- Endophthalmitis
- Papillitis
- Optic neuritis

Clinical Significance:

Potential for vision loss

Management Approach:

- Initiate empiric broad-spectrum intravenous antibiotics based on blood culture results
- Administer targeted antibiotic therapy for 4-6 weeks depending on the causative organism
- Monitor for septic emboli with regular fundoscopic examinations
- Treat endophthalmitis with intravitreal antibiotics if present
- Consider early vitrectomy in cases of severe endophthalmitis
- Perform serial echocardiograms to monitor vegetation size and cardiac function

- Coordinate care with infectious disease specialists and cardiologists
- Consider surgical intervention for large vegetations or persistent bacteremia (Neudorfer et al.,1993)

4.2.7.Kawasaki's disease

Ocular Manifestations:

- Bilateral bulbar conjunctivitis
- Anterior uveitis
- Papilledema
- Retinal ischemia
- Dacrocystitis

Clinical Significance:

Potential for vision loss

Management Approach:

- Initiate high-dose intravenous immunoglobulin (IVIG) 2g/kg as a single infusion within 10 days of fever onset
- Administer high-dose aspirin (80-100mg/kg/day) during acute phase until fever resolves
- Transition to low-dose aspirin (3-5mg/kg/day) after fever resolution for 6-8 weeks
- Monitor for coronary artery aneurysms with serial echocardiograms

- Consider second dose of IVIG for refractory cases
- Use pulse methylprednisolone (30mg/kg/day) for IVIG-resistant cases
- Treat anterior uveitis with topical steroids (prednisolone acetate 1%)
- Regular ophthalmologic follow-up to monitor ocular inflammation

(Atzeni et al,2005)

4.2.8.Temporal arteritis

Ocular Manifestations:

- Amaurosis fugax
- Anterior ischemic optic neuropathy
- Central retinal artery occlusion
- Cilioretinal artery occlusion
- Posterior optic neuropathy
- Choroidal ischemia

Clinical Significance:

High risk of irreversible blindness

Management Approach:

IV methylprednisolone 1000mg daily for 3-5 days in acute vision loss

Transition to oral prednisone 1mg/kg/day (max 60mg)

Methotrexate 15-25mg weekly for steroid-sparing

Maintain prednisone > 20mg until acute phase reactants normalize

Bone density monitoring and bisphosphonate prophylaxis

(González-Gay et al,2019)

4.2.9.Hypertension

Ocular Manifestations:

- Arteriolar narrowing
- Hemorrhages
- Cotton-wool spots
- Macular edema
- Retinal vein occlusion
- Retinal artery occlusion
- Retinal macroaneurysm
- Ischemic optic neuropathy

Clinical Significance:

- Potential for vision loss
- Signal of systemic vascular disease

Management Approach:

Control systemic blood pressure to prevent further ocular damage.

Use antihypertensive medications such as ACE inhibitors, ARBs, or calcium channel blockers.

Monitor for hypertensive crises and manage with intravenous medications if necessary.

Perform regular fundus examinations to assess progression of hypertensive retinopathy.

Treat complications such as macular edema with anti-VEGF therapy or laser photocoagulation.

Address secondary conditions like retinal vein occlusion or ischemic optic neuropathy.

Coordinate care with a cardiologist or primary care physician for comprehensive management.

(Ong et al,2013)

4.2.10.Diabetes

Ocular Manifestations:

- Non-proliferative diabetic retinopathy
- Pre-proliferative diabetic retinopathy
- Proliferative diabetic retinopathy
- Central retinal artery occlusion
- Central retinal vein occlusion
- Ocular motor nerve palsies
- Bacterial endophthalmitis
- Rhinocerebral mucormycosis

Clinical Significance:

Potential for vision loss\nBlindness

Management Approach:

Pan-retinal photocoagulation (1200-1600 burns of 500µm)

Anti-VEGF (ranibizumab 0.3mg/aflibercept 2mg) q4weeks for 3 months

Intensive glycemic control (HbA1c < 7.0%)

Early vitrectomy for non-clearing hemorrhage/tractional detachment

OCT angiography and fluorescein angiography q3-4 months

(Bahrami et al.,2017)

4.3. Conclusion

The exploration of ocular manifestations in systemic and infectious diseases underscores the critical role of early recognition and targeted management in preventing irreversible vision loss. This comprehensive review highlights the diverse spectrum of ocular complications, ranging from anterior segment inflammation to posterior segment pathologies, each necessitating a tailored therapeutic approach. The integration of systemic disease management with advanced ophthalmic interventions, such as anti-VEGF therapy, corticosteroid regimens, and surgical techniques, has significantly improved patient outcomes. Furthermore, the importance of interdisciplinary collaboration between ophthalmologists and systemic disease specialists cannot be overstated, as it ensures holistic patient care. Future research should focus on the development of novel diagnostic tools and therapeutic modalities to further enhance the management of these complex conditions.

5. References

Shinde, V. S., & Birru, J. D. (2024). The Use of Point-of-Care Ultrasound for a Rapid Diagnosis of Endophthalmitis: A Case Report. *Cureus*, *16*(9), e68609.

Eleftheriadou, Maria, et al. "The rapid access eye clinic's playbook: how to cut eye casualty attendance by 50%." *Eye* 38.2 (2024): 259-265.

Rossi, T., Boccassini, B., Iossa, M., Mutolo, M. G., Lesnoni, G., & Mutolo, P. A. (2007). Triaging and coding ophthalmic emergency-The Rome Eye Scoring System for Urgency and Emergency (RESCUE): A pilot study of 1000 eye-dedicated emergency room patients. *European journal of ophthalmology*, *17*(3), 413-417.

Al-Arrayedh, Hammed, et al. "An audit of primary care referrals to the Ophthalmic Accident and Emergency Department of the Royal Victoria Eye and Ear Hospital, Dublin." (2023).

Evans, Dian Dowling, and Karen Sue Hoyt. "Ophthalmologic Emergencies: Assessment and Management." *Advanced Emergency Nursing Journal* 45.4 (2023): E9-E38.

Shah, S. M., & Khanna, C. L. (2020, May). Ophthalmic emergencies for the clinician. In *Mayo Clinic Proceedings* (Vol. 95, No. 5, pp. 1050-1058). Elsevier.

Mahendradas, P., Acharya, I., Rana, V., Bansal, R., Ben Amor, H., & Khairallah, M. (2024). Optical coherence tomography and optical coherence tomography angiography in neglected diseases. *Ocular Immunology and Inflammation*, *32*(7), 1427-1434.

Cristescu, I. E., Ochinciuc, R., Balta, F., & Zagrean, L. (2019). High-resolution imaging of diabetic retinopathy lesions using an

adaptive optics retinal camera. *Romanian journal of ophthalmology*, *63*(1), 29.

Shu, X., Wang, J., & Hu, L. (2019). A review of functional slit lamp biomicroscopy. *Eye and Vision*, *6*, 1-9.

Corboy, J. M. (2024). The Retinoscope: How It Works. In *The Retinoscopy Book* (pp. 7-16). CRC Press.

Driban, M., Yan, A., Selvam, A., Ong, J., Vupparaboina, K. K., & Chhablani, J. (2024). Artificial intelligence in chorioretinal pathology through fundoscopy: a comprehensive review. *International Journal of Retina and Vitreous*, *10*(1), 36.

Cook, J. A., Botello, A. P., Elders, A., Ali, A. F., Azuara-Blanco, A., Fraser, C., ... & Surveillance of Ocular Hypertension Study Group. (2012). Systematic review of the agreement of tonometers with Goldmann applanation tonometry. *Ophthalmology*, *119*(8), 1552-1557.

Nolan, W., & Onakoya, A. (2022). Gonioscopy skills and techniques. *Community Eye Health*, *34*(112), 40.

Saleh, G. A., Batouty, N. M., Haggag, S., Elnakib, A., Khalifa, F., Taher, F., ... & El-Baz, A. (2022). The role of medical image modalities and AI in the early detection, diagnosis and grading of retinal diseases: a survey. *Bioengineering*, *9*(8), 366.

Lains, I., Wang, J. C., Cui, Y., Katz, R., Vingopoulos, F., Staurenghi, G., ... & Miller, J. B. (2021). Retinal applications of swept source optical coherence tomography (OCT) and optical coherence tomography angiography (OCTA). *Progress in retinal and eye research*, *84*, 100951.

Silverman, R. H. (2023). Principles of ophthalmic ultrasound. *Expert review of ophthalmology*, *18*(6), 379-389.

Asam, J. S., Polzer, M., Tafreshi, A., Hirnschall, N., & Findl, O. (2019). Anterior segment OCT. *High resolution imaging in microscopy and ophthalmology: new frontiers in biomedical optics*, 285-299.

Jeannin, A., Mouriaux, F., & Mortemousque, B. (2016). Management of ophthalmologic emergencies in general emergency departments: A retrospective multicenter study. *Journal Francais D'ophtalmologie*, *39*(7), 589-595.

Joshua H., et al. Training in and comfort with diagnosis and management of ophthalmic emergencies among emergency medicine physicians in the United States. *Eye*, 2020, 34.9: 1504-1511

Mahendradas, P., Acharya, I., Rana, V., Bansal, R., Ben Amor, H., & Khairallah, M. (2024). Optical coherence tomography and optical coherence tomography angiography in neglected diseases. *Ocular Immunology and Inflammation*, *32*(7), 1427-1434.

Shu, X., Wang, J., & Hu, L. (2019). A review of functional slit lamp biomicroscopy. *Eye and Vision*, *6*, 1-9.

Keeler, C. R. (2002). The ophthalmoscope in the lifetime of Hermann von Helmholtz. *Archives of ophthalmology*, *120*(2), 194-201.

Asam, J. S., Polzer, M., Tafreshi, A., Hirnschall, N., & Findl, O. (2019). Anterior segment OCT. *High resolution imaging in microscopy and ophthalmology: new frontiers in biomedical optics*, 285-299.

Aroch, I., Ofri, R., & Sutton, G. A. (2009). Ocular manifestations of systemic diseases. *Slatter's fundamentals of veterinary ophthalmology*, 374.

Biousse, V., Nahab, F., & Newman, N. J. (2018). Management of acute retinal ischemia: follow the guidelines!. *Ophthalmology*, *125*(10), 1597-1607.

Tsan, G. L., & Claiborne, R. T. (2021). Ocular syphilis. *Clinical and Experimental Optometry*, *104*(7), 756-759.

Sanjay, S., Huang, P., & Lavanya, R. (2011). Herpes zoster ophthalmicus. *Current treatment options in neurology*, *13*(1), 79-91.

Lindström, B. E., Skogman, B. H., Lindström, A. K., Tallstedt, L., & Nilsson, K. (2022). Borrelia ocular infection: a case report and a systematic review of published cases. *Ophthalmic Research*, *65*(2), 121-130.

Teoh, S. C., Ou, X., & Lim, T. H. (2012). Intravitreal ganciclovir maintenance injection for cytomegalovirus retinitis: efficacy of a low-volume, intermediate-dose regimen. *Ophthalmology*, *119*(3), 588-595.

Suresh, P. S. (2016). Bilateral disciform keratitis in Reiter's syndrome. *Indian journal of ophthalmology*, *64*(9), 685-687.

Neudorfer, M., Barnea, Y., Geyer, O., & Siegman-Igra, Y. (1993). Retinal lesions in septicemia. *American Journal of Ophthalmology*, *116*(6), 728-734.

Atzeni, F., Sarzi-Puttini, P., Doria, A., Iaccarino, L., & Capsoni, F. (2005). Potential off-label use of infliximab in autoimmune and non-autoimmune diseases: a review. *Autoimmunity reviews*, *4*(3), 144-152.

González-Gay, M. Á., Pina, T., Prieto-Peña, D., Calderon-Goercke, M., Gualillo, O., & Castañeda, S. (2019). Treatment of giant cell arteritis. *Biochemical Pharmacology*, *165*, 230-239.

Ong, Y. T., Wong, T. Y., Klein, R., Klein, B. E., Mitchell, P., Sharrett, A. R., ... & Ikram, M. K. (2013). Hypertensive retinopathy and risk of stroke. *Hypertension*, *62*(4), 706-711.

Bahrami, B., Hong, T., Gilles, M. C., & Chang, A. (2017). Anti-VEGF therapy for diabetic eye diseases. *Asia-Pacific journal of ophthalmology*, *6*(6), 535-545.

KIRMIZI GÖZ VE ÖN SEGMENT ACILLERI

İRFAN UZUN[2]

Giriş

Kırmızı göz, hastaların oftalmoloji kliniklerine başvurularının yaygın bir nedenidir. Bu durum, oküler inflamasyonun önemli bir göstergesi olan göz ve göz kapakları damarlarının genişlemesiyle karakterizedir. Kırmızı göz, orbitada bir sinyal mekanizmasıdır (Toptan, Cadirci & Kocakoglu, 2021). Kırmızı göze neden olan faktörlerden acil müdahale gerektirenleri ayırt edebilmek, hastanın sağlığını korumak ve ciddi komplikasyonları önlemek açısından büyük önem taşır (Palamar, 2021). Kırmızı göz, genellikle iyi prognozlu ve kendi kendini sınırlayıcı bir şikayet olarak karşımıza çıksa da, keratit, üveit veya endoftalmi gibi ciddi durumların erken tanınması ve kalıcı sonuçların önlenmesi için eksiksiz muayene ile erken tedavi stratejisi hayati önem taşır (Toptan, Cadirci & Kocakoglu, 2021; Palamar, 2021). Kırmızı göz, konjonktival damarlar, episkleral damarlar veya bunların bir kombinasyonunun genişlemesinden kaynaklanabilir. Konjonktival damarlar kırmızı renkte görünür ve hareketlidir,

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episkleral damarlar daha soluk kırmızı renktedir ve daha az hareketlidir (Singh ve ark., 2021). Kırmızı gözün nedenleri çok çeşitlidir ve çoğu iyi huylu ve kendi kendini sınırlayıcı niteliktedir. Bununla birlikte, bazı nedenleri görmeyi tehdit edebilir ve acil tanı ve tedavi gerektirir (Gilani ve ark., 2017; Mahmood & Narang, 2004). Kanlanma şeklinin ayırt edilmesi, kırmızı göz nedeninin doğru teşhisinde kritik bir öneme sahiptir. Yüzeyel kanlanma, konjonktivit gibi basit nedenlerde görülür ve bu durumda kanlanma limbus çevresinde az, fornikslerde daha fazladır. Ancak endoftalmi gibi daha ciddi durumlarda, kanlanma limbusda belirgin, fornikslerde ise daha azdır. Yüzeyel kanlanmada göz kapağı yukarı kaldırıldığında damarların hareket ettiği gözlenebilirken, kanlanma derin ise damarlar sabit kalır. Ayrıca, fenilefrin damlatılması yüzeyel kanlanmayı söndürürken, derin olanda bir değişiklik meydana gelmez. Bu farklılıklar, kırmızı göz nedeninin doğru değerlendirilmesinde kritik bir rol oynar (Palamar, 2021) (Şekil 1).

Kırmızı göz ve ön segment acillerine yol açan durumlar dört ana başlık altında incelenecektir:

1.Akut Konjonktivit ve Keratitler

2.Üveit ve Glokom Krizleri

3.Göz Kapağı ve Orbita Acilleri

4.Ön Segment Travmaları ve Yanıklar

Şekil 1. Keratit sonrası kornea ülseri ve derin limbal hiperemi (Harran Göz Hastalıkları arşivinden)

1. Akut Konjonktivit ve Keratitler

1.1 Akut Konjonktivit

Konjonktivit, göz küresinin beyaz kısmını ve göz kapaklarının içini kaplayan ince zar olan konjonktivanın iltihaplanmasıdır (Mahmood & Narang, 2004**).** Konjonktiva, göz küresi ile göz kapağı arasında hareket etmeyi kolaylaştırmak için bir mukus tabakası üreten goblet hücreleri içerir (Singh ve ark., 2021). Genellikle görme seviyesi korunmuştur. Kanlanma, akıntı, konjonktivada şişme, konjonktivada papiller ve folliküller görülebilir (Palamar, 2021). Konjonktivit, kırmızı gözün en sık nedenidir ve viral, bakteriyel, alerjik ve tahriş edici olmak üzere çok çeşitli nedenlerle ortaya çıkabilir (Mahmood & Narang, 2004).

Etiyoloji:

Konjonktivit, bulaşıcı ve bulaşıcı olmayan olmak üzere iki temel kategoriye ayrılır:

- **Bulaşıcı Konjonktivit:** Genellikle virüsler ve bakteriler olmak üzere enfeksiyöz ajanlar bulaşıcı konjonktivite neden olur. Viral konjonktivit, özellikle adenovirüslerin neden olduğu epidemik keratokonjonktivit, en sık görülen konjonktivit türüdür (Bekmez & Eris, 2020). Bakteriyel konjonktivite ise genellikle Staphylococcus aureus, Streptococcus pneumoniae ve Haemophilus influenzae gibi bakteriler neden olur.
- **Bulaşıcı Olmayan Konjonktivit:** Bulaşıcı olmayan konjonktivitin kökeninde alerjiler, kimyasallar, tahriş edici maddeler, kuru göz veya sistemik hastalıklar gibi faktörler yatabilir (Módis & Süveges, 2023). Örneğin, kontakt lens kullanımı, gözde mekanik tahriş oluşturarak dev papiller konjonktivite yol açabilir (Módis & Süveges, 2023).

Klinik Belirtiler:

Konjonktivitin belirti ve bulguları, altta yatan nedene ve iltihaplanmanın şiddetine göre değişiklik gösterebilir. Genellikle her iki gözü etkiler ve sıklıkla şunları içerir:

- **Kırmızı Göz (Hiperemi):** Konjonktival damarların genişlemesinden kaynaklanır ve konjonktivitin en belirgin özelliğidir.
- **Yanma veya Kaşıntı:** Enfeksiyöz veya alerjik konjonktivitte sık görülen bir semptomdur.

- **Yabancı Cisim Hissi:** Konjonktival inflamasyon, gözde kum veya yabancı cisim varmış hissine neden olabilir.
- **Göz Kapağı Şişliği:** Konjonktival inflamasyon, göz kapaklarında ödem ve şişliğe yol açabilir.
- **Bulanık Görme:** Şiddetli konjonktivitte, kornea tutulumu veya göz akıntısı nedeniyle bulanık görme olabilir.
- **Işığa Duyarlılık (Fotofobi):** Keratit varlığında veya şiddetli konjonktival inflamasyonda ortaya çıkabilir.
- **Göz Akıntısı:** Akıntının karakteri nedene bağlı olarak değişir. Viral konjonktivitte sulu bir akıntı görülürken, bakteriyel konjonktivitte sarı veya yeşil renkte ve yapışkan bir akıntı gözlenir. Örneğin, akut alerjik konjonktivitte gözde şeffaf ve sulu bir akıntı, konjonktivada ise hiperemi ve kemozis gözlemlenebilir (Módis & Süveges, 2023).

Tanı:

Konjonktivit tanısı, hastanın öyküsü, semptomları ve göz muayenesi bulgularına dayanılarak konur.

- **Hastanın Öyküsü:** Hastanın semptomlarının başlangıcı, süresi, şiddeti ve karakteri, olası nedenler hakkında önemli ipuçları sağlayabilir. Örneğin, mevsimsel alerjik konjonktivit, alerjenlere maruz kalma ile ilişkili olarak, özellikle bahar aylarında ortaya çıkar (Módis & Süveges, 2023).
- **Göz Muayenesi:** Konjonktivanın görünümü, göz akıntısının varlığı ve karakteri, göz kapaklarının durumu ve korneanın tutulumu dikkatlice değerlendirilir. Vernal

keratokonjonktivitte, üst tarsal konjonktivada dev papiller hipertrofi, gözlemlenen karakteristik bir bulgudur (Módis & Süveges, 2023).

- **Laboratuvar Testleri:** Konjonktivitin nedenini kesin olarak belirlemek için laboratuvar testleri kullanılabilir:

    - **Göz Akıntısı Kültürü:** Bakteriyel konjonktivitten şüpheleniliyorsa, etken bakterinin tanımlanması ve uygun antibiyotik tedavisinin belirlenmesi için göz akıntısı kültürü yapılır.
    - **Viral Kültür veya PCR:** Viral konjonktivitten şüpheleniliyorsa, özellikle adenoviral konjonktivit gibi epidemik potansiyeli olan durumlarda viral kültür veya PCR testi yapılabilir.

Viral Konjonktivit

Viral konjonktivit, genellikle adenovirüsler tarafından kaynaklanır ve kırmızı gözün en sık karşılaşılan nedenidir (Toptan, Cadirci & Kocakoglu, 2021). Adenoviral konjonktivit bulaşıcıdır ve doğrudan temas veya aerosol yoluyla bulaşır (Yeu & Hauswirth, 2020). Viral konjonktivit genellikle kendi kendini sınırlayan bir durumdur ve semptomları genellikle bir ila iki hafta içinde geçer (Mahmood & Narang, 2004). Ancak, epidemik keratokonjonktivit gibi bazı viral konjonktivit türleri, kornea tutulumu ve buna bağlı görme keskinliğinde azalma gibi komplikasyonlara yol açabilir (Mahmood & Narang, 2004; Toptan ve ark., 2021). Epidemik keratokonjonktivit, adenovirüsün bazı serotipleri tarafından (özellikle 8, 19 ve 37) neden olunan ciddi bir viral konjonktivit formudur (Mahmood & Narang, 2007). Epidemik keratokonjonktivite özgü olarak, 1-2 mm boyutlarında, grimsi beyaz, "kırıntı benzeri" 30'a kadar sayıda korneal subepitelyal infiltratlar,

korneanın merkezi ve periferik bölgelerinde görülebilir (Mahmood & Narang, 2004). Epidemik keratokonjonktivit ayrıca subkonjonktival kanama, ön üveit, keratit, optik nörit ve kronik kornea opasitelerine de yol açabilir (Yeu & Hauswirth, 2020). Viral konjonktivit ayrıca fotofobi ve görme azalması ile de ilişkili olabilir (Mahmood & Narang, 2020). Tedavi genellikle destekleyici olup soğuk kompres, suni gözyaşı ve antihistaminikler kullanılabilir. Bazı durumlarda, antiviral ilaçlar gerekebilir. Povidon iyodin, antiviral etkisi nedeniyle adenoviral konjonktivitin tedavisinde kullanılabilir ve bazı çalışmalarda subepitelyal kornea infiltratlarının oranını azalttığı gösterilmiştir (Bekmez & Eris, 2020; Soleimani ve ark., 2023; Altan-Yaycioglu ve ark., 2019; Kovalyuk ve ark., 2017).

Bakteriyel Konjonktivit

Bakteriyel konjonktivit, genellikle Staphylococcus aureus, Streptococcus pneumoniae veya Haemophilus influenzae gibi bakteriler tarafından kaynaklanır ve tipik olarak antibiyotik göz damlası veya merhem ile tedavi edilir (Mahmood & Narang, 2004). Pürülan akıntı, kirpiklerde kabuklanma ve sabah göz kapaklarının yapışması tipik bulgulardır (Palamar, 2021). Temas yoluyla bulaşabildiği için hijyen önlemlerine dikkat edilmesi önemlidir (Hovding, 2008). Metisiline dirençli Staphylococcus aureus (MRSA) konjonktivit vakaları da bildirilmiştir (Shanmuganathan ve ark., 2005). Klamidyal konjonktivit, trahom olarak da bilinir ve tedavi edilmediğinde körlüğe yol açabilir (Palamar, 2021). Bakteriyel konjonktivitin doğrudan ve dolaylı maliyetinin Amerika Birleşik Devletleri'nde yılda yaklaşık 377 milyon ila 857 milyon dolar olduğu tahmin edilmektedir (Smith & Waycaster, 2009). Streptococcus pneumoniae'nin ST448 suşu tarafından kaynaklanan bir konjonktivit salgınında, maliyetlerin yılda yaklaşık 178 milyon dolar olduğu tahmin edilmiştir (Zegans ve ark., 2009).

Alerjik Konjonktivit

Mevsimsel alerjik konjonktivit, vernal keratokonjonktivit, atopik keratokonjonktivit ve kontakt alerji gibi farklı tipleri vardır (Palamar, 2021; Módis & Süveges, 2023). Mevsimsel alerjik konjonktivit, polenler, toz akarları ve hayvan tüyleri gibi alerjenlere maruz kalma sonucu ortaya çıkar ve genellikle kaşıntı, sulu akıntı ve gözlerde şişlik ile karakterizedir (Palamar, 2021). Vernal keratokonjonktivit, çocuklarda ve genç erişkinlerde görülen, şiddetli kaşıntı, fotofobi ve mukuslu akıntı ile karakterize bir alerjik reaksiyondur. Atopik keratokonjonktivit, atopik dermatit gibi diğer alerjik hastalıklara sahip kişilerde görülür ve şiddetli kaşıntı, göz kapaklarında egzama ve kornea hasarı ile karakterizedir. Kontakt alerji, kozmetikler, ilaçlar ve kontakt lens solüsyonları gibi maddelere maruz kalma sonucu ortaya çıkar ve genellikle kaşıntı, kızarıklık ve şişlik ile karakterizedir (Módis & Süveges, 2023).

Mast hücreleri, alerjik konjonktivitte önemli bir rol oynar. Alerjenlere maruz kalma, konjonktival mast hücrelerinin degranülasyonuna, histamin, lökotrienler ve prostaglandinler gibi inflamatuar mediatörlerin salınmasına yol açar. Bu mediatörler, kaşıntı, kızarıklık, şişme ve sulu akıntı gibi alerjik konjonktivit semptomlarından sorumludur (Singh ve ark., 2021). Alerjik konjonktivitin tedavisi, alerjenden kaçınmayı ve semptomları hafifletmeyi amaçlar (Mahmood & Narang, 2004). Soğuk kompresler, yapay gözyaşları, topikal antihistaminikler ve mast hücresi stabilizatörleri semptomları kontrol altına almak için kullanılabilir. Şiddetli vakalarda, kısa süreli topikal kortikosteroidler reçete edilebilir. Topikal siklosporin, kronik alerjik konjonktivit vakalarında etkili bir tedavi seçeneği olabilir (Módis & Süveges, 2023). Alerjik konjonktivit, en sık görülen oküler alerjik hastalıktır ve dünya nüfusunun %20'sini etkiler (Rosario & Bielory, 2011).

1.2 Keratit

Keratit, gözün önündeki saydam tabaka olan korneanın iltihaplanmasıdır. Kornea, ışığı kırmaktan ve gözün net bir şekilde görmesine yardımcı olmaktan sorumludur (Singh ve ark., 2021). Keratit, ağrı, fotofobi (ışığa duyarlılık), görme bulanıklığı ve korneada opasite gibi semptomlara neden olur (Palamar, 2021). Keratit, bakteriler, virüsler, mantarlar veya parazitler dahil olmak üzere çeşitli enfeksiyöz ajanlardan kaynaklanabilir. Mikrobiyal keratit için risk faktörleri arasında kontakt lens kullanımı, kornea travması, göz ameliyatı, immünosüpresyon ve tropikal iklimlerde yaşamak yer alır (Keay & ark., 2006; Liesegang, 1997). Ayrıca travma sonucu da ortaya çıkabilir. Keratit görme kaybına neden olabilir ve çoğu zaman acil tıbbi müdahale gerektirir. Dünya çapında, mikrobiyal keratit yılda tahmini 1,5 milyon yeni vaka ile önemli bir morbidite ve körlük nedenidir (Ung & ark., 2019).

Etiyoloji:

Keratit, enfeksiyöz ve enfeksiyöz olmayan nedenlere bağlı olarak gelişebilir:

- **Enfeksiyöz Keratit:** Bakteriler, virüsler, mantarlar ve parazitler enfeksiyöz keratite neden olabilir. Kontakt lens kullanımı, kornea travması, göz cerrahisi ve bağışıklık sistemi baskılanması enfeksiyöz keratit riskini artırır. Özellikle Acanthamoeba keratiti, kontakt lens kullanıcılarında sık görülür (Mascarenhas ve ark., 2013).
- **Bakteriyel keratitler**: Kornea epitelinin bütünlüğünün bozulmasına yol açan travma ve kontakt lens kullanımı bakteriyel keratit gelişimini kolaylaştırır. Başlangıçta, inflamasyon alanında epitel defekti ve stromal infiltrasyon izlenirken ilerleyen dönemlerde hipopiyon da tabloya eşlik edebilir.

- **Fungal keratitler**: Organik kaynaklı travma öyküsü varsa akla gelmelidir. Klinik yavaş seyirlidir ancak tanıda yaşanan gecikmeler nedeniyle prognoz genellikle kötüdür (Palamar, 2021).
- **Viral keratitler**: Herpes simplex etyolojide sık görülür. Klinik olarak dendritik ülser (korneada dallanmış ağaç görünümünde ülser) en sık görülen bulgudur (Palamar, 2021).
- **Paraziter keratitler**: Kontakt lens veya kontamine su öyküsü olan kişilerde Acanthamoeba nedeniyle ortaya çıkar. Hafif kliniğe kıyasla ağrı şiddetlidir. Geç tanı görme kaybıyla sonuçlanır (Palamar, 2021).
- **Enfeksiyöz Olmayan Keratit:** Enfeksiyöz olmayan keratit, kuru göz, göz kapağı hastalıkları, travma, kimyasal yanıklar, yetersiz beslenme ve sistemik hastalıklar gibi faktörlerden kaynaklanabilir (Módis & Süveges, 2023). Örneğin, Mooren ülseri, limbusun damar ağının sklerozuna bağlı olarak gelişen, genellikle yaşlı erkeklerde görülen bir tür periferal ülseratif keratittir (Módis & Süveges, 2023).

Klinik Belirtiler:

Keratitin belirti ve bulguları, nedene ve iltihaplanmanın şiddetine göre değişir. En sık görülen semptomlar şunlardır:

- **Ağrı:** Keratitte ağrı şiddetli olabilir ve gözün derinliklerinden gelir.

- **Kırmızı Göz:** Kornea çevresindeki kan damarlarının genişlemesi sonucu göz kızarır.
- **Bulanık Görme:** Korneadaki iltihaplanma, ışığın geçmesini engelleyerek bulanık görmeye neden olur.
- **Işığa Duyarlılık (Fotofobi):** Işık, korneadaki sinir uçlarını uyararak rahatsızlık ve ağrıya neden olabilir.
- **Göz Yaşarması:** Göz, iltihaplanmaya tepki olarak aşırı göz yaşı üretebilir.
- **Göz Kapağı Spazmı (Blefarospazm):** Ağrı ve rahatsızlığı azaltmak için göz kapağı istemsiz olarak kapanabilir.
- **Kornea Ülseri:** Korneanın yüzeyinde oluşan açık yara, enfeksiyöz keratitin ciddi bir komplikasyonudur ve kalıcı görme kaybına yol açabilir (Mascarenhas ve ark., 2013). Periferal ülseratif keratitte, limbusun yakınında başlayan 3-4 mm uzunluğunda, yay şeklinde bir infiltrasyon ülserleşir ve ardından perforasyona uğrayabilir (Módis & Süveges, 2023).

Tanı:

Keratit tanısı, ayrıntılı bir göz muayenesi ve laboratuvar testleri ile konur.

- **Göz Muayenesi:** Slit-lamba biyomikroskopisi, korneanın detaylı bir şekilde incelenmesini sağlar. Floresan boya testi, kornea epitelindeki hasarı ve ülserleri ortaya çıkarır (Mascarenhas ve ark., 2013).
- **Laboratuvar Testleri:** Enfeksiyöz keratitten şüpheleniliyorsa, etken mikroorganizmayı tanımlamak

için kornea kazıması ve kültürü yapılır. Viral keratitten şüpheleniliyorsa, viral PCR testi istenebilir. Konfokal mikroskopi, enfeksiyöz keratit tanısında, özellikle fungal ve Acanthamoeba keratitinin ayırıcı tanısında kullanılabilir (Mascarenhas ve ark., 2013).

Tedavi:

Keratit tedavisi, altta yatan nedene ve iltihaplanma şiddetine bağlı olarak değişir.

- **Enfeksiyöz Keratit:** Enfeksiyöz keratitin tedavisi, etken mikroorganizmayı hedefleyen antimikrobiyal ilaçları içerir.
    - **Bakteriyel Keratit:** Bakteriyel keratitin tedavisinde genellikle sık aralıklarla uygulanan topikal antibiyotik damlalar kullanılır (Mascarenhas ve ark., 2013). Şiddetli vakalarda, sistemik antibiyotik tedavisi gerekebilir. Fortifiye antibiyotikler, özellikle şiddetli veya tedaviye dirençli vakalarda kullanılabilir (Mascarenhas ve ark., 2013).
    - **Viral Keratit:** Viral keratit tedavisinde antiviral ilaçlar kullanılır. Herpes simpleks keratiti gibi tekrarlayan viral keratitlerde, uzun süreli antiviral ilaç tedavisi gerekebilir. Adenoviral keratokonjonktivit sonrası gelişen subepitelyal infiltratların tedavisinde topikal siklosporin veya takrolimus kullanılabilir (Bekmez & Eris, 2020).
    - **Fungal Keratit:** Fungal keratit tedavisinde antifungal ilaçlar kullanılır. Tedavisi genellikle uzundur ve göz damlaları, merhemler veya tabletler şeklinde uygulanabilir. Topikal natamisin ve vorikonazol, fungal keratitin tedavisinde kullanılan

yaygın antifungal ajanlardır (Mascarenhas ve ark., 2013).

- **Enfeksiyöz Olmayan Keratit:** Enfeksiyöz olmayan keratitin tedavisi, altta yatan nedene yöneliktir. Kuru göz durumunda, yapay gözyaşları ve göz kapağı hijyeni önerilir. İltihaplanmayı azaltmak için NSAID'ler veya kortikosteroidler kullanılabilir. Periferal ülseratif keratitte, topikal kortikosteroid ve siklosporin damlaları kullanılabilir (Módis & Süveges, 2023). Kornea ülseri gibi ciddi komplikasyonlarda, kornea transplantasyonu gerekebilir.

2. Üveit ve Glokom Krizleri

2.1 Üveit

Üveit, gözün orta tabakası olan üveanın inflamasyonudur. Üvea, iris, siliyer cisim ve koroidi içerir. Yakın komşuluk nedeniyle inflamasyona genellikle retina, vitreus ve optik sinir gibi diğer intraoküler yapılar da katılır. Üveitin nedenleri arasında enfeksiyonlar (toksplazmoz, herpes simpleks virüsü, sitomegalovirüs, sifiliz, tüberküloz), otoimmün hastalıklar (Behçet hastalığı, sarkoidoz, ankilozan spondilit, romatoid artrit), travma ve idiopatik nedenler yer alır (Schwartzman, 2016). Üveit, görme kaybına neden olabilen ciddi bir durumdur. Üveit prevalansı coğrafi bölgeye ve etnik kökene göre değişmektedir ve dünya çapında bildirilen prevalans 75/100.000 ile 714/100.000 arasında değişmektedir (Miserocchi & ark., 2013).

Üveitin Sınıflandırılması:

Üveit, inflamasyonun yeri, süresi, etyolojik ve inflamatuar yanıt özelliklerine göre sınıflandırılır.

- **Anatomik Yerleşim:** En sık kullanılan anatomik sınıflamadır.
    - **Ön Üveit:** En yaygın üveit türüdür ve genellikle iris ve siliyer cismi etkiler. Ön üveit genellikle akut başlangıçlıdır ve birkaç hafta içinde tedaviyle iyileşir. Ancak, tekrarlayan ataklar olabilir ve bazı durumlarda kronikleşebilir. Kornea endotelinde keratik presipitatlar, ön kamarada hücre, flare, fibrin ve hipopiyon gibi bulgular görülür. Herpes simpleks virüs (HSV) veya varisella zoster virüs (VZV) enfeksiyonları sonucu gelişebilir. Bu durumda endotelde keratik presipitatlar, iriste atrofi, pupil distorsiyonu ve göz içi basıncında artış gibi bulgular görülebilir.
    - **Orta Üveit:** Vitreus (gözün içini dolduran jel benzeri madde) ve pars plana (silier cisim ve koroid arasındaki bölge) inflamasyonudur. Semptomları arasında görme bulanıklığı ve floaters (uçuşan cisimler) yer alır. Pars plana bölgesinde eksudasyon ve kartopu opasiteleri görülebilir. Orta üveit, ön üveite göre daha az sık görülür ve genellikle daha sinsi bir başlangıç gösterir. En sık neden idiyopatik formdur.
    - **Arka Üveit:** Retinanın ve koroidin inflamasyonudur. Arka üveit, önemli bir üveit tipidir ve kalıcı görme kaybına neden olabilir. Görme kaybı, lezyonun makulaya yakınlığı ile orantılıdır. Retinit/koroidit odakları, perivasküler kılıflanma, retinal ven/arter tıkanıklığı, optik disk ödemi ve maküler ödem görülebilir. Behçet hastalığı, sistemik lupus eritematozus (SLE), poliarteritis nodoza (PAN) ve

toksoplazmozis arka üveite neden olabilen sistemik hastalıklardır.

- **Panüveit:** Üveanın tüm bölümlerinin inflamasyonudur. Hem ön hem de arka üveit bulgularını gösterir. Panüveit, genellikle sistemik hastalıklarla ilişkilidir ve agresif bir şekilde tedavi edilmesi gerekir. Behçet ve sarkoidoz gibi hastalıklar infeksiyöz olmayan panüveit nedenleri arasında yer alırken, tüberküloz, toksoplazmozis ve sifilis infeksiyöz panüveit etkenleridir.

- **Süre**:
  - **Akut Üveit:** Ani başlangıçlı ve kısa sürelidir.
  - **Kronik Üveit:** Uzun süreli ve tekrarlayan ataklar halinde olabilir. Tedaviye rağmen 3 ay içinde tekrarlayan vakalardır.

Üveitin Nedenleri:

Üveitin nedenleri oldukça çeşitlidir ve bazen kesin neden belirlenemeyebilir (Oncul, Kara & Ozdal, 2021). Türkiye'de yapılan bir çalışmaya göre; üveitlerin etiyolojik nedeni %76.1 infeksiyöz olmayan, %15.6 enfeksiyöz ve %8.2 idiyopatik hastalıklardır. Non-infeksiyöz patolojiler arasında Behçet %24.9 oranıyla sık görülen bir etkendir (Yalcindag & ark., 2018).

- **Enfeksiyonlar:** Bakteriler, virüsler, mantarlar ve parazitler üveite neden olabilir. Örneğin, herpes simpleks virüsü, varicella-zoster virüsü ve Epstein-Barr virüsü gibi virüsler ön üveite neden olabilirken, toksoplazma ve tüberküloz gibi enfeksiyonlar da üveite yol açabilir.

- **Otoimmün Hastalıklar:** Vücudun bağışıklık sistemi, gözün kendi dokularına saldırdığında üveit gelişebilir (Módis & Süveges, 2023). Ankilozan spondilit, Behçet hastalığı, sarkoidoz ve romatoid artrit gibi hastalıklar üveit ile ilişkilidir (Oncul, Kara & Ozdal, 2021).
- **Travma:** Göze alınan bir darbe üveite neden olabilir.
- **İlaçlar:** Bazı ilaçlar, yan etki olarak üveite yol açabilir (Módis & Süveges, 2023). Örneğin, bifosfonatlar, sülfonamidler ve rifampisin gibi ilaçlar üveit ile ilişkilendirilmiştir (Oncul, Kara & Ozdal, 2021).
- **İdiyopatik Üveit:** Bazı durumlarda, üveitin nedeni belirlenemeyebilir.

Üveitin Belirtileri:

Üveitin belirtileri, inflamasyonun yerine ve ciddiyetine göre değişebilir.

- **Göz Ağrısı:** Genellikle etkilenen gözde hissedilir ve şiddeti değişebilir.
- **Kızarıklık:** Ön üveit ve ön kamara tutulumu olan panüveitte, ön kamarada akut inflamasyon sunucu görülür (Güven Yılmaz, 2021; Sızmaz, 2012).
- **Bulanık Görme:** Görme keskinliğinde azalma olabilir.
- **Işığa Duyarlılık (Fotofobi):** Parlak ışığa karşı hassasiyet olabilir.
- **Yüzen Cisimler Görme:** Görme alanında küçük lekeler veya iplikçikler hareket ediyormuş gibi görünebilir.
- **Göz Yaşarması:** Gözlerde aşırı sulanma olabilir.

Üveitin Teşhisi:

Üveit teşhisi, detaylı bir göz muayenesi ile konur.

- **Görme Keskinliği Testi:** Görme kaybını değerlendirmek için görme keskinliği testi yapılır.
- **Ön Segment Muayenesi:** Biomikroskop (slit lamba) kullanarak üveanın iltihaplanma belirtileri (kızarıklık, şişlik, hücreler) aranır. Keratik presipitatlar (kornea endotelde inflamatuar hücre birikimleri) ön üveitte görülür.
- **Göz İçi Basıncının Ölçülmesi (Tonometri):** Glokom riskini değerlendirmek için göz içi basıncı ölçülebilir.
- **Fundus Muayenesi:** Gözün arka kısmını (retina, koroid) değerlendirmek için göz bebekleri genişletilerek fundus muayenesi yapılabilir.
- **Ek Testler:**
    - **Kan testleri:** Enfeksiyon veya otoimmün hastalıkları araştırmak için yapılabilir.
    - **Görüntüleme testleri:** Gözün ve çevresindeki dokuların ayrıntılı görüntülerini elde etmek için yapılabilir.
    - **Göz sıvısı analizi (aköz humor veya vitreus):** Enfeksiyon veya inflamasyonun nedenini belirlemek için yapılabilir.

Üveitin Tedavisi:

Üveit tedavisi, altta yatan nedene, inflamasyonun yerine ve ciddiyetine göre değişir (Oncul, Kara & Ozdal, 2021). Üveitte tedavinin amacı, inflamasyonu azaltarak ağrıyı engellemek, dokuların hasar görmesini önlemek ve tekrarlamanın önüne geçmektir. Arka segment tutulumunda tedavi daha zor ve

karmaşıktır. Arka segment tutulumu %50 oranında görülür ve bunlar %10 görme kaybıyla sonuçlanır (Güven Yılmaz, 2021).

- **İlaçlar:**
    - **Kortikosteroidler:** İnflamasyonu azaltmak için kullanılır. Göz damlası, hap veya enjeksiyon şeklinde uygulanabilir. Sistemik ve topikal steroidler tedavinin temel unsurlarını oluşturur. Ön üveitlerde lokal damla tedavisi yeterli olur, arka üveitlerde ise tedavi sistemiktir.
    - **İmmünsüpresif ilaçlar:** Otoimmün üveitte kullanılır.
    - **Antibiyotikler, antiviral ilaçlar veya antifungal ilaçlar:** Enfeksiyöz üveitin nedenine bağlı olarak kullanılır.
    - **Göz Bebeklerini Genişleten İlaçlar (Midriatikler):** Ön üveitte, irisin lensle yapışmasını önlemek ve ağrıyı hafifletmek için kullanılabilir.
- **Cerrahi:** Nadiren, üveitin komplikasyonlarını tedavi etmek için cerrahi müdahale gerekebilir. Örneğin, katarakt veya glokom gelişirse cerrahi müdahale düşünülebilir.

Üveitin Komplikasyonları:

Tedavi edilmediği takdirde üveit, ciddi komplikasyonlara yol açabilir (Módis & Süveges, 2023).

- **Glokom:** Optik atrofiye neden olarak görme kaybı ile sonuçlanabilir.
- **Katarakt:** Göz merceğinin bulanıklaşmasıdır ve görme kaybına neden olabilir.

- **Maküler Ödem:** Makulanın (retinanın merkezi kısmı) şişmesi, görme kaybına neden olabilir.
- **Retina Dekolmanı:** Ciddi görme kaybına neden olabilir.

Üveitin Prognozu:

Üveitin prognozu, nedenine, yerine, ciddiyetine ve tedaviye yanıta bağlı olarak değişir (Oncul, Kara & Ozdal, 2021). Erken teşhis ve tedavi, üveitin neden olduğu komplikasyon riskini azaltmak için önemlidir (Módis & Süveges, 2023).

2.2 Glokom

Optik sinirdeki hasarın ve görme kaybının nedeni göz içi basınç artışıdır. Dünyada kalıcı körlüğün en yaygın nedenlerinden biridir (Quigley & Broman, 2006). Glokom genellikle yavaş ilerler ve erken evrelerde belirti vermeyebilir, bu nedenle erken teşhis ve tedavi çok önemlidir.

Glokom Çeşitleri:

Glokom, çeşitli faktörlere göre sınıflandırılır, bunlar arasında drenaj açısının durumu, başlangıç yaşı ve neden bulunur:

- **Açık Açılı Glokom (AAG):** En yaygın glokom türüdür (Cassard ve ark., 2012). Gözün drenaj açısı açıktır, ancak göz sıvısı (aköz humor) düzgün akamaz, bu da göz içi basıncında kademeli bir artışa neden olur. AAG genellikle belirtisiz başlar ve yavaş ilerler, bu nedenle erken teşhis zor olabilir.
- **Açı Kapanması Glokomu (AKG):** İrisin gözün drenaj açısını bloke etmesiyle oluşur (Suwan ve ark., 2017; Kumar ve ark., 2009). Bu, göz içi basıncında ani ve şiddetli bir artışa neden olabilir (akut AKG), bu da şiddetli göz ağrısı, baş ağrısı, bulanık görme, mide bulantısı ve kusma gibi belirtilerle kendini gösterir. AKG,

kronik olarak da gelişebilir, bu durumda belirtiler daha hafif olabilir veya hiç olmayabilir (Suwan ve ark., 2017).

- **Normal Tansiyonlu Glokom:** Optik sinir hasarı ve görme kaybı, normal göz içi basıncına rağmen meydana gelir. Nedeni tam olarak bilinmese de, optik siniri besleyen kan damarlarındaki zayıf kan akışının rol oynadığı düşünülmektedir.
- **Konjenital Glokom:** Doğumda veya erken çocukluk döneminde mevcuttur ve genellikle gözün drenaj sistemindeki bir gelişimsel kusurdan kaynaklanır (Gorin, 1964).
- **Sekonder Glokom:** Diğer göz hastalıkları veya durumlarının sonucu olarak gelişen glokomdur (Toptan ve ark., 2021). Bu durumlar arasında üveit, katarakt, göz travması ve diyabet sayılabilir (Toptan ve ark., 2021; Módis & Süveges, 2023). Bazı ilaçlar da sekonder glokoma neden olabilir (Razeghinejad ve ark., 2011).

Glokomun Belirtileri:

AAG genellikle erken evrelerde belirti göstermez. Hastalık ilerledikçe, periferik (yan) görmede kayıp ve sonunda tünel görüşü gelişebilir. Akut AKG ise ani ve şiddetli göz ağrısı, baş ağrısı, bulanık görme, mide bulantısı ve kusma gibi belirtilerle kendini gösterir (Suwan ve ark., 2017).

Glokomun Teşhisi:

Glokom tanısı koymak için bir dizi test kullanılır:

- **Göz İçi Basıncının Ölçülmesi (Tonometri):** Göz içi basıncını ölçmek için kullanılan bir testtir. Göz içi

basıncı, gözün içindeki sıvı basıncıdır ve gözün şeklini korumaya ve retinanın sağlıklı kalmasına yardımcı olur.

- **Gonioskopi:** Gözün drenaj açısının açıklığını değerlendirmek için kullanılır.
- **Optik Sinir Muayenesi:** Optik sinirde hasar olup olmadığını değerlendirmek için kullanılır.
- **Görme Alanı Testi:** Periferik görme kaybını tespit etmek için kullanılır.
- **Optik Sinir Görüntüleme:** Optik sinirin ayrıntılı görüntülerini elde etmek için optik koherens tomografi (OCT) gibi görüntüleme testleri kullanılabilir (Muller & Geerling, 2008).

Glokomun Tedavisi:

Glokom tedavisinin amacı, göz içi basıncını düşürerek optik sinir hasarını ve görme kaybını önlemektir. Tedavi seçenekleri:

- **İlaçlar:** Glokom tedavisinde kullanılan çeşitli ilaçlar vardır. Bu ilaçlar göz sıvısı üretimini azaltarak veya drenajını artırarak göz içi basıncını düşürürler.
- **Lazer Tedavisi:**
  - **Selektif Lazer Trabeküloplasti (SLT):** Açık açılı glokomda göz içi basıncını düşürmek için kullanılır.
  - **Lazer İridotomi:** Açı kapanması glokomunda drenajı iyileştirmek için irise küçük bir delik açar.
- **Cerrahi:**
  - **Trabekülektomi:** Göz sıvısı için yeni bir drenaj yolu oluşturur.

- **Gonyotomi:** Göz sıvısı drenajını iyileştirmek için gözün drenaj açısını genişletir.
- **Kanaloplasti:** Gözün doğal drenaj sistemini genişletir ve göz içi basıncını düşürür.

Glokom ve Diğer Göz Hastalıkları:

- **Üveit:** Üveit, glokom riskini artırabilir. Üveitin neden olduğu inflamasyon, gözün drenaj açısını bloke ederek veya göz sıvısı üretimini artırarak göz içi basıncında artışa neden olabilir. Üveitli hastalarda glokom gelişme riski nedeniyle, bu hastaların düzenli göz muayeneleri yaptırmaları ve göz içi basınçlarının izlenmesi önemlidir (Módis & Süveges, 2023).
- **Katarakt:** Katarakt cerrahisi, bazı durumlarda glokomu tetikleyebilir veya kötüleştirebilir. Katarakt cerrahisi geçiren hastalarda göz içi basıncının yakından izlenmesi ve glokom belirtileri ortaya çıkarsa gerekli tedaviye başlanması önemlidir.

Glokomun Önlenmesi:

Glokomu tamamen önlemek mümkün olmasa da, risk faktörlerini kontrol altına almak ve düzenli göz muayeneleri yaptırmak glokom riskini azaltmaya ve erken teşhis edilmesini sağlamaya yardımcı olabilir.

Kırmızı Göz ve Glokom:

Kırmızı göz, genellikle konjonktivit gibi iyi huylu ve kendi kendini sınırlayan durumlardan kaynaklansa da, glokom gibi ciddi durumların da bir belirtisi olabilir. Akut AKG, kırmızı göze neden olabilen ve aynı zamanda görme azlığı ve göz içi basıncı artışına yol açabilen önemli bir nedendir. Bu nedenle, kırmızı göz şikayeti olan hastaların ayrıntılı bir şekilde muayene edilmesi ve gerekli

tetkiklerin yapılması (tonometri, gonioskopi vb.) körlük gibi ciddi sonuçların önlenmesi açısından kritik öneme sahiptir (Toptan ve ark., 2021).

Glokomasiklitik Kriz

Glokomasiklitik kriz, tekrarlayan tek taraflı akut iritis atakları ile karakterize bir glokom tipidir. Göz içi basıncı artar, kornea ödemlenir ve ön kamarada flare görülebilir. Herpetik üveitten ayırt edilmesi önemlidir. Tedavide antiglokomatöz ajanlar ve kortikosteroidler kullanılır. Pilokarpin gibi siliyer spazmı tetikleyebilecek ilaçlardan kaçınılmalıdır (Sızmaz, 2012).

Glokom Krizi

Glokom krizi, göz içi basıncının ani ve hızlı bir şekilde yükselmesiyle karakterizedir. Bu durum acil tedavi gerektirir çünkü tedavi edilmezse kalıcı görme kaybına yol açabilir. Akut AKG, irisin gözün drenaj açısını bloke etmesiyle oluşur ve bu da göz içi sıvısının birikmesine ve göz içi basıncında hızlı bir artışa neden olur (Mahmood & Narang, 2004). Akut AKG, genellikle orta yaşlı ve ileri yaşlı kişilerde, özellikle de hipermetrop olanlarda daha sık görülür.

Glokom krizine yol açabilen faktörler şunlardır:

- **Gözün Drenaj Açısının Daralması veya Kapanması:** Gözün ön kamarası ile arka kamarası arasındaki sıvının drenajını sağlayan açının daralması veya kapanması, göz içi basıncının yükselmesine ve glokom krizine yol açabilir.
- **Göz Bebeğinin Genişlemesi (Midriyazis):** Göz bebeğinin genişlemesi, irisin kalınlaşmasına ve drenaj

açısını bloke etmesine neden olarak akut glokom atağını tetikleyebilir.

- **Bazı İlaçlar:** Bazı ilaçlar göz bebeğinin genişlemesine neden olarak glokom krizini tetikleyebilir. Örneğin, topiramat gibi bazı ilaçlar akut açı kapanması glokomuna yol açabilir (Patel & Ramchandran, 2023).

Glokom krizlerine neden olabilecek diğer faktörler:

- **Travma:** Göze alınan bir darbe, gözün drenaj sistemine zarar vererek glokom krizine neden olabilir.
- **Diğer göz hastalıkları:** Üveit gibi diğer göz hastalıkları, göz içi iltihabı artırarak veya drenajı engelleyerek glokom krizlerine neden olabilir (Bansal ve ark., 2023).

Glokom krizi belirtileri genellikle ani ve şiddetlidir:

- **Ani ve Şiddetli Göz Ağrısı:** Hastalar genellikle bıçak saplanır tarzda tarif edilen şiddetli bir göz ağrısı yaşarlar. Ağrı, baş ve yüz bölgesine yayılabilir.
- **Görme Bulanıklığı:** Göz içi basıncının yükselmesi korneada ödeme ve bulanık görmeye neden olur.
- **Işığa Duyarlılık (Fotofobi):** Hastalar genellikle ışıktan rahatsızlık duyarlar.
- **Gözde Kızarıklık**
- **Mide Bulantısı ve Kusma:** Glokom krizi, şiddetli göz ağrısı nedeniyle bulantı ve kusmaya neden olabilir.
- **Baş Ağrısı:** Göz ağrısı ile birlikte şiddetli baş ağrısı olabilir.

Glokom krizinin tedavisi acildir ve amacı göz içi basıncını mümkün olan en kısa sürede düşürmektir. Glokom krizinin tedavisinde aşağıdaki yöntemler kullanılır:

- **Göz İçi Basıncını Düşürmek İçin İlaçlar:** Topikal beta blokerler, alfa agonistler, karbonik anhidraz inhibitörleri ve osmotik ajanlar gibi ilaçlar göz içi basıncını düşürmek için kullanılır.
- **Lazer İridotomi:** Lazer iridotomi, iriste küçük bir delik açılarak gözün drenaj açısını açmak ve göz içi sıvısının akışını kolaylaştırmak için kullanılan bir işlemdir. Lazer iridotomi, glokom krizini önlemek için de kullanılabilir.
- **Cerrahi:** İlaç tedavisi veya lazer iridotomi ile kontrol altına alınamayan glokom krizlerinde cerrahi müdahale gerekebilir. Trabekülektomi cerrahisi, implant cerrahileri gibi hastalığın durumuna göre farklı cerrahiler vardır.

3. Göz Kapağı ve Orbita Acilleri

Göz kapağı ve orbita acilleri, göz kapağı ve orbita bölgesinde ani gelişen ve acil müdahale gerektiren durumlardır. Bu durumlar, enfeksiyonlardan travmalara kadar çeşitli nedenlerden kaynaklanabilir ve görme kaybına yol açma potansiyeline sahiptir.

3.1 Göz Kapağı Acilleri

Göz kapakları, gözün ön segmentini koruyan, göz yaşı filmini yayarak ve yabancı cisimlerin göze girmesini engelleyerek görme sağlığında önemli bir rol oynar. Göz kapağı acilleri, göz kapağının yapısını ve fonksiyonunu etkileyen çeşitli durumları kapsar. Bunlar arasında enfeksiyonlar, alerjik reaksiyonlar, travmalar ve diğer göz kapağı hastalıkları yer alır.

Enfeksiyonlar

Blefarit

Blefarit, göz kapağı kenarlarının kronik iltihaplanmasıdır ve genellikle göz kapağı kenarlarında bulunan yağ bezlerinin tıkanması nedeniyle oluşur. Blefarit yaygın bir kronik göz rahatsızlığıdır (Tarff, 2017). Blefarit, stafilokoksik veya seboreik olmak üzere iki ana tipte olabilir. Stafilokoksik blefarit, bakteriyel bir enfeksiyondur ve genellikle kirpik diplerinde sarı kabuklanmalarla kendini gösterir. Seboreik blefarit ise, yağ bezlerinin aşırı çalışması ile ilişkilidir ve kirpik diplerinde yağlı, kepek benzeri pullarla kendini gösterir. Her iki tip blefaritte de batma hissi ve gözlerde kanlanma gibi semptomlar görülebilir. Blefarit tedavisi, altta yatan nedene bağlı olarak değişir. Kapak kenarı hijyeni, ılık kompresler ve topikal antibiyotikler, stafilokoksik blefarit tedavisinde kullanılırken, seboreik blefarit tedavisinde kapak kenarı temizliği, ılık kompresler ve anti-kepek şampuanları kullanılır (Palamar, 2021).

Şalazyon (Meibom kisti)

Kapaklardaki tarsal dokuda yer alan bezlerin ağızlarının tıkanması nedeni ile oluşan, kronik inflamatuar bir granülomdur. Kapakda sert bir ağrısız kitle şeklinde görülür. Tedavi, ılık kompresler, kapak masajı, topikal kortikosteroidler ve nadiren steroid enjeksiyonlarını içerir. Şalazyon, kendiliğinden drene olabilir veya cerrahi olarak çıkarılabilir.

Hordeolum (Arpacık)

Göz kapağında, genellikle kirpik folikülü veya meibom bezinin, bakteriyel enfeksiyonu sonucu oluşan ağrılı bir şişliktir. Dış hordeolum, kirpik folikülü iltihabıdır ve kapak kenarında lokalize bir şişlik olarak görülür. İç hordeolum ise, meibom bezi iltihabıdır ve göz kapağı içinde gelişir. Hordeolum, genellikle kızarıklık, ağrı, hassasiyet, şişlik ve bazen de irinleşme ile kendini gösterir. Tedavi, ılık kompresler, kapak kenarı hijyeni ve topikal antibiyotikleri içerir.

Bazen, ağrıyı hafifletmek ve drenajı sağlamak için arpacığın insizyon ve drenajı gerekebilir (Palamar, 2021).

Allerjik Reaksiyonlar

Göz kapağı derisi, alerjenlere karşı oldukça hassastır. Polen, toz akarları, hayvan tüyleri ve kozmetik ürünler gibi alerjenler, göz kapağında alerjik reaksiyonlara neden olabilir (Módis & Süveges, 2023). Göz kapağı alerjik reaksiyonları, kaşıntı, şişlik, kızarıklık ve deride döküntü ile karakterizedir. Tedavide alerjenden kaçınma, soğuk kompres, topikal antihistaminikler ve kortikosteroidler kullanılabilir.

Göz kapağı travmaları

Göz kapağı travmaları, kesikler, laserasyonlar, ezilmeler ve yanıklar gibi çeşitli şekillerde olabilir. Bu yaralanmalar, fonksiyonel ve kozmetik problemlere neden olabilir.

- **Kesikler ve Laserasyonlar:** Keskin nesnelerin neden olduğu yaralanmalardır. Göz kapağının tam kat kalınlığını veya sadece bir kısmını etkileyebilirler (Şekil 2).
- **Ezilmeler:** Künt travma sonucu oluşur. Göz kapağı dokularında kanama ve şişliğe neden olabilirler.
- **Yanıklar:** Kimyasal maddeler veya ısı ile temas sonucu oluşur. Göz kapağı dokularında hasara ve skarlaşmaya neden olabilirler.

Travma tedavisi, yaralanmanın türüne ve şiddetine bağlıdır. Basit yaralanmalar için soğuk kompres ve antibiyotikli merhemler yeterli olabilirken, ciddi travmalar cerrahi müdahale gerektirebilir. Basit kesikler, genellikle dikişlerle kapatılabilir. Daha karmaşık yaralanmalar, cerrahi onarım veya rekonstrüksiyon gerektirebilir.

Şekil 2. Travma sonrası göz kapağı ve kaş kesisi (Harran Göz Hastalıkları arşivinden)

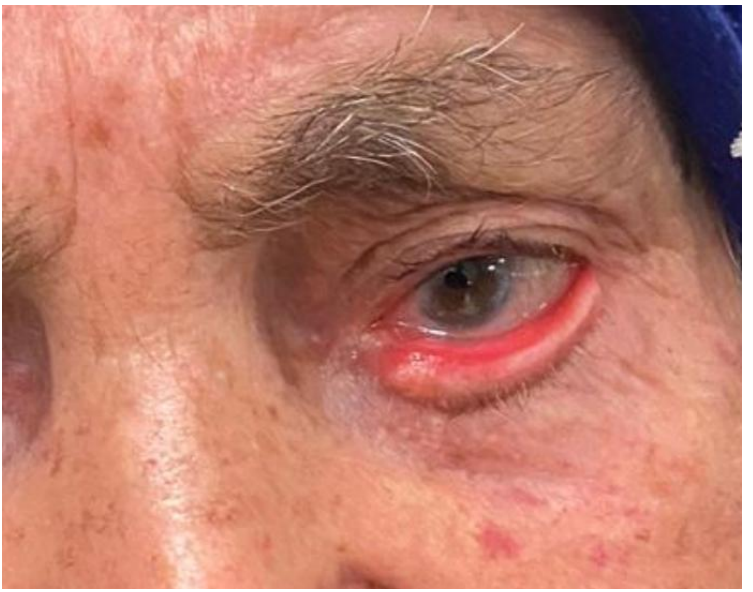
Entropion

Göz kapağının içe doğru dönmesi durumudur. Genellikle alt göz kapağında görülür ve kirpiklerin korneaya sürtünmesine neden olur. Bu durum, gözde tahriş, batma, yanma hissi, aşırı sulanma ve kornea hasarı ile kendini gösterir. Tedavi edilmediği takdirde kornea ülseri, skarlaşma ve hatta görme kaybına yol açabilir. Entropionun en sık nedeni yaşlanmaya bağlı kas ve bağ dokusunun gevşemesi olsa da, travma, enfeksiyon, yanıklar ve önceki göz kapağı ameliyatları gibi faktörler de rol oynayabilir. Tedavi genellikle cerrahi olup, altta yatan nedene ve semptomların şiddetine bağlı olarak çeşitli teknikler kullanılabilir (Palamar, 2021).

Ektropion

Kapağın dış tarafa doğru şekil değiştirmesi durumudur. Göz kapağı olarak altta daha yaygın olarak görülür. Ektropiyum, punktumun gözyaşı drenaj sisteminden uzaklaşmasına neden olarak gözde sulanma, kuruluk, tahriş ve kornea hasarına yol açar. Yaşlanma, en yaygın neden olmakla birlikte, fasiyal sinir felci, travma, yanıklar ve önceki göz kapağı ameliyatları da ektropiuma neden olabilir. Tedavi, altta yatan nedene ve semptomların şiddetine bağlı olarak değişir ve suni gözyaşı damlaları, göz kapağı bantları veya cerrahi müdahaleyi içerir (Şekil 3).

Şekil 3. Senil ektropion (Harran Göz Hastalıkları arşivinden)



3.2 Orbita Acilleri

Orbita, göz küresini, kaslarını, sinirlerini, kan damarlarını ve yağ dokusunu içeren koni şeklinde bir boşluktur. Orbita acilleri, görme fonksiyonunu ve hastanın sağlığını tehdit edebilen ciddi durumları içerir ve bu nedenle hızlı tanı ve tedavi gerektirir. Orbita acillerinin en sık karşılaşılan nedenleri, klinik prezentasyonları, tanısal yaklaşımları ve tedavi seçenekleri ele alınacaktır.

Orbita Selüliti

Orbita içindeki yumuşak dokuların enfeksiyonudur. Genellikle sinüzit, diş enfeksiyonu veya cilt enfeksiyonu gibi komşu bir enfeksiyonun yayılmasıyla veya travma sonucu gelişir. Çocuklarda yetişkinlerden daha sık görülür, çünkü çocukların sinüsleri tam olarak gelişmemiştir ve enfeksiyonların orbitaya yayılma olasılığı daha yüksektir (Palamar, 2021) (Şekil 4).

Şekil 4. Orbital sellülit (Harran Göz Hastalıkları arşivinden)

Klinik Prezentasyon:

Orbita selülitinin belirti ve semptomları genellikle hızlı bir şekilde ortaya çıkar ve şunları içerir:

- **Göz kapağı ödemi ve kızarıklık:** Enfeksiyon nedeniyle orbita dokularında ödem ve iltihaplanma meydana gelir, bu da göz kapağında belirgin bir şişlik ve kızarıklığa neden olur.
- **Ağrı:** Orbita ve çevresindeki dokularda şiddetli ağrı hissedilir, özellikle göz hareketleri ile ağrı artabilir.
- **Propitozis:** Göz küresinin öne doğru itilmesidir. Orbita dokularındaki şişlik, göz küresini öne doğru iterek proptozise neden olur.
- **Oftalmopleji:** Göz hareketlerinin kısıtlanmasıdır. Orbita içindeki ekstraoküler kasların iltihaplanması veya sinirlerin sıkışması, göz hareketlerinde kısıtlılığa yol açar.
- **Görme kaybı:** Enfeksiyon optik sinire yayılırsa veya propitozis nedeniyle optik sinir sıkışırsa, görme kaybı meydana gelebilir.

- **Ateş:** Vücut enfeksiyonla savaşmak için ateşle yanıt verebilir.

Tanı:

Orbita selüliti tanısı, hastanın klinik öyküsü, fizik muayenesi ve görüntüleme testlerine dayanır.

- **Öykü ve Fizik Muayene:** Hastanın yakın zamanda geçirdiği sinüzit, diş enfeksiyonu veya üst solunum yolu enfeksiyonu gibi durumlar sorgulanmalıdır. Fizik muayenede göz kapağı ödemi, kızarıklık, propitozis, oftalmopleji ve görme keskinliğinde azalma gibi bulgular değerlendirilmelidir.
- **Görüntüleme Testleri:** Orbita selülitini doğrulamak ve enfeksiyonun yayılımını değerlendirmek için kullanılabilir.

Tedavi:

Orbita selüliti tedavisi acildir ve şunları içerir:

- **İntravenöz Antibiyotikler:** Enfeksiyonun kontrol altına alınması için geniş spektrumlu intravenöz antibiyotikler uygulanmalıdır.
- **Hastaneye Yatış:** Hastaların genellikle hastaneye yatırılması ve yakından izlenmesi gerekir.
- **Cerrahi Drenaj:** Bazı durumlarda, örneğin apse oluşumu varsa, cerrahi drenaj gerekebilir.

Orbital Travma

Orbital travma, künt veya delici yaralanmalardan kaynaklanabilir. Orbital kırıklar, en sık karşılaşılan orbital travma türüdür ve genellikle yüz kemiklerine gelen darbelerden kaynaklanır.

Orbital kırıklar, göz küresinin yer değiştirmesine (enoftalmi veya ekzoftalmi), diplopiye (çift görme), göz kapağı ödemine ve hematoma (morarma) neden olabilir. Retrobulber hematom, orbita içinde kan birikmesidir ve acil cerrahi drenaj gerektirebilen görme kaybına neden olabilir (Guldager, 2022).

Oküler travmalar, çocuklarda da sık görülen bir sorundur (Cariello ve ark., 2007; Pardhi ve ark., 2015; Diniz ve ark., 2003; Puodžiuvienė ve ark., 2018). Çocuklarda oküler travmaların en sık nedenleri düşmeler, spor yaralanmaları ve oyuncaklarla olan kazalardır (Cariello ve ark., 2007; Pardhi ve ark., 2015; Diniz ve ark., 2003; Puodžiuvienė ve ark., 2018).

Orbital kırık

Orbita kırıkları, genellikle künt travma sonucu oluşur ve yüz kemiklerinin kırıklarına sıklıkla eşlik edebilirler. Kırığın yeri ve şiddeti, semptomların çeşitliliğini ve tedavi yaklaşımını belirler.

Klinik Prezentasyon:

Orbita kırıklarının belirti ve semptomları kırığın yerine ve şiddetine bağlı olarak değişir ve şunları içerebilir:

- **Diplopi (Çift Görme):** Orbita kırığı ekstraoküler kasları veya sinirleri etkileyerek göz hareketlerinde bozulmaya ve çift görmeye neden olabilir.
- **Enoftalmos (Göz Küresinin İçeri Doğru Batması):** Orbita hacmi genişlerse veya orbita dokusunda kayıp olursa, göz küresi içeri doğru batabilir.
- **Göz Kapağı Ödemi ve Ekimoz:** Kırık bölgesinde kanama ve ödem oluşabilir.

- **Göz Hareketlerinde Kısıtlılık:** Kırık ekstraoküler kasları veya sinirleri sıkıştırarak göz hareketlerinde kısıtlılığa neden olabilir.
- **Anestezi veya Parestezi:** Kırık infraorbital siniri etkilerse, yanakta ve üst dudakta uyuşma veya karıncalanma hissi olabilir.

Tanı:

Orbita kırığı tanısı, klinik öykü, fizik muayene ve görüntüleme testlerine dayanır.

- **Öykü ve Fizik Muayene:** Travma öyküsü, özellikle künt travma önemlidir. Fizik muayenede diplopi, enoftalmos, göz kapağı ödemi, göz hareketlerinde kısıtlılık ve anestezi gibi bulgular değerlendirilmelidir.
- **Görüntüleme Testleri:** Kırığın varlığını, yerini ve şiddetini doğrulamak için BT taraması altın standarttır.

Tedavi:

Orbita kırıklarının tedavisi, kırığın tipine, yerleşimine ve şiddetine, ayrıca eşlik eden yaralanmalara ve semptomlara bağlı olarak değişir.

- **Gözlem:** Bazı orbita kırıkları, özellikle küçük ve stabil olanlar, kendiliğinden iyileşebilir ve sadece gözlem gerektirebilir.
- **Cerrahi Onarım:** Büyük, instabil veya görme fonksiyonunu tehdit eden kırıklar cerrahi onarım gerektirebilir. Cerrahi seçenekler arasında kırık parçalarının yeniden konumlandırılması, kemik greftleri veya implantlar kullanılarak rekonstrüksiyon yer alır.

Orbita hematomu

Orbita içinde kan birikmesi durumudur. Travma, cerrahi veya spontan olarak gelişebilir. Belirtiler arasında göz çevresinde morarma, şişlik, ağrı, propitozis, göz hareketlerinde kısıtlılık ve görme kaybı yer alır. Tedavisi hematomun boyutuna ve görme fonksiyonuna etkisine bağlıdır. Küçük hematomlar kendiliğinden emilebilirken, büyük hematomlar cerrahi drenaj gerektirebilir.

Optik sinir basısı

Orbita içindeki basınç artışı sonucu optik sinirin sıkışması durumudur. Orbital hematom, tümör veya enfeksiyon optik sinire bası yapabilir. Belirtiler arasında ani görme kaybı, renk görme bozukluğu, görme alanında defektler ve afferent pupiller defekt yer alır. Tedavisi acildir ve basıya neden olan faktörün ortadan kaldırılmasını içerir. Gecikmiş tedavi optik atrofiye sebep olarak kalıcı görme kaybına yol açabilir.

Tiroid Göz Hastalığı (Graves Oftalmopatisi)

Tiroid hormonlarının aşırı üretimiyle ilişkili otoimmün bir hastalık olan tiroid göz hastalığı, orbita dokularının inflamasyonu ve doku yeniden şekillenmesi ile karakterizedir. Tiroid göz hastalığı semptom ve bulguları, orbitanın enflamasyonu ve doku yeniden şekillenmesinin sonucudur. Tiroid göz hastalığında skar oluşumu, kas dokusunda enflamasyon ve/veya orbital yağ kompartmanında artış orbital yeniden şekillenmeye ve hacim genişlemesine neden olur. Yeniden şekillenen orbital doku ya çoğunlukla yağ dokusu (tip I hastalık), çoğunlukla kas ve skar dokusu (tip II hastalık) ya da her ikisinin bir kombinasyonu haline gelir (Gupta & ark., 2022).

Klinik Prezentasyon:

Tiroid göz hastalığının belirti ve semptomları kişiden kişiye değişir ve şunları içerebilir:

- **Propitozis:** Göz küresinin öne doğru itilmesidir. Orbita dokularındaki inflamasyon ve doku yeniden şekillenmesi nedeniyle göz küresi öne doğru itilir.
- **Göz Kapağı Retraksiyonu:** Üst göz kapağının normalden daha yüksek konumlandırılmasıdır. Bu durum, gözün beyaz kısmının daha fazla görünmesine neden olur.
- **Konjunktival Enjeksiyon:** Konjunktiva kızarır.
- **Diplopi:** Çift görme. Ekstraoküler kasların inflamasyon ve doku yeniden şekillenmesi nedeniyle göz hareketlerinde bozulma meydana gelir.
- **Görme Kaybı:** Optik sinirin sıkışması veya kornea hasarı nedeniyle görme kaybı meydana gelebilir.

Tanı:

Tiroid göz hastalığı tanısı, klinik öykü, fizik muayene, kan testleri ve görüntüleme testlerine dayanır.

- **Öykü ve Fizik Muayene:** Hipertiroidizm öyküsü veya belirtileri önemlidir. Fizik muayenede propitozis, göz kapağı retraksiyonu, konjunktival enjeksiyon, diplopi ve görme keskinliğinde azalma gibi bulgular değerlendirilir.
- **Kan Testleri:** Tiroid fonksiyonunu değerlendirmek için tiroid hormon düzeyleri ölçülür.
- **Görüntüleme Testleri:** Orbita dokularındaki inflamasyon ve doku yeniden şekillenmesi değerlendirmek için BT veya MRG kullanılabilir.

Tedavi:

Tiroid göz hastalığı tedavisi, hastalığın aktivitesine ve semptomların şiddetine bağlı olarak değişir.

- **Gözlem:** Hafif semptomları olan hastalar, semptomların ilerleyip ilerlemediğini görmek için yakından izlenebilir.
- **İlaç Tedavisi:**
    - **Kortikosteroidler:** inflamasyon ve doku yeniden şekillenmesini azaltmak için kullanılabilir.
    - **İmmünsüpresifler:** Bağışıklık sistemini baskılamak ve inflamasyonu azaltmak için kullanılabilir.
- **Cerrahi Müdahale:**
    - Orbita Dekompresyonu: Orbita hacmini genişleterek propitozisi azaltmak ve optik siniri rahatlatmak için yapılabilir.
    - Göz Kapağı Cerrahisi: Göz kapağı retraksiyonunu düzeltmek için yapılabilir.
    - Strabismus Cerrahisi: Diplopiden kaynaklanan göz hizalama sorunlarını düzeltmek için yapılabilir.

Dakriyosistit

Dakriyosistit, gözyaşı kesesinin iltihaplanmasıdır. Gözyaşı drenaj sisteminin tıkanması nedeniyle oluşur ve genellikle bakteriyel bir enfeksiyonla ilişkilidir. Yetişkinlerde akut veya kronik olarak ortaya çıkabilir (Palamar, 2021) (Şekil 5).

Şekil 5. Dakriyosistit (Harran Göz Hastalıkları arşivinden)

Klinik Prezentasyon:

- **Epifora (Göz Yaşarması):** Gözyaşı drenajının engellenmesi nedeniyle gözde sürekli sulanma olur.
- **Sekresyon:** Gözyaşı kesesinde irin birikmesi nedeniyle gözde yapışkan veya sarımsı bir akıntı olabilir.
- **Kese Bölgesinde Şişlik ve Kızarıklık:** Gözyaşı kesesi bölgesinde şişlik ve kızarıklık oluşur.
- **Ağrı ve Hassasiyet:** Gözyaşı kesesi bölgesine dokunulduğunda ağrı ve hassasiyet hissedilir.

Tanı:

- **Klinik Muayene:** Öykü ve fizik muayene genellikle tanıyı koymak için yeterlidir.
- **Gözyaşı Kesesi Sondajı ve İrrigasyonu:** Gözyaşı drenaj sistemini değerlendirmek ve tıkanıklığı doğrulamak için yapılabilir.
- **Görüntüleme Testleri:** Şüpheli durumlarda, dakriyosistitin nedenini ve komplikasyonlarını değerlendirmek için BT veya MRG kullanılabilir.

Tedavi:

- **Akut Dakriyosistit:**
  - Sıcak Kompresler: Şişlik ve ağrıyı azaltmak için uygulanabilir.
  - Sistemik Antibiyotikler: Enfeksiyonu tedavi etmek için reçete edilir.
  - Cerrahi Drenaj: Apse oluşumu varsa gerekebilir.
- **Kronik Dakriyosistit:**
  - Dakriosistorinostomi (DCR): Gözyaşı drenajını yeniden sağlamak için bir cerrahi işlemdir.

Orbital Tümörler

Orbital tümörler, orbita içinde gelişen anormal hücre büyümeleridir. İyi huylu veya kötü huylu olabilirler. İyi huylu tümörler, genellikle yavaş büyür ve yayılmazlar. Kötü huylu tümörler ise, hızlı büyür ve çevre dokulara yayılabilirler. Orbital tümörler, proptozise, diplopiye, göz hareketlerinde kısıtlılığa, ağrıya ve görme kaybına neden olabilir. Tedavi, tümörün tipine ve evresine bağlıdır ve cerrahi, radyoterapi veya kemoterapiyi içerebilir.

4. Ön Segment Travmaları ve Yanıklar

Ön segment travmaları ve yanıkları, gözün ön kısmını (kornea, ön kamara, iris ve lens) etkileyen yaralanmalardır. Bu yaralanmalara, çeşitli nesneler (örneğin, toz, kir, metal parçaları, kimyasallar) veya kuvvetler (örneğin, darbe, patlama) neden olabilir (Puodžiuvienė ve ark., 2018; Ikeda ve ark., 2006; Korkmaz ve ark., 2022).

4.1 Ön Segment Travmaları

Ön segment travmaları, künt veya penetran olabilir. Kornea ve konjonktiva yırtıklarını ve yabancı cisim penetrasyonunu içerebilir. Kunt göz travması, genellikle yüksek hızlı, künt bir cismin çarpması sonucu oluşur (Kiziloglu ve ark., 2013). Tedavi, yaralanmanın ciddiyetine bağlı olarak değişir ve göz damlası, merhem, bandaj veya cerrahi müdahaleyi içerebilir. Oküler travmanın küresel olarak, farklı çalışmalara göre %2 ile %14 arasında değişmekle birlikte, önde gelen körlük nedenlerinden biri olduğu tahmin edilmektedir (Puodžiuvienė & ark., 2018).

Künt travmalar

Göze doğrudan bir darbe sonucu oluşur. Spor yaralanmaları, düşmeler, trafik kazaları ve saldırılar gibi olaylar künt travmalara neden olabilir (Schein ve ark., 1988; Cillino ve ark., 2008).

- **Hifema:** Ön kamarada kan birikmesi durumudur. Künt travma sonucu iris veya siliyer cisimdeki kan damarlarının yırtılmasıyla oluşur. Hifema, görme kaybına ve hatta trabeküler ağın tıkanması ile glokoma yol açabilir. Hifemanın boyutu, ön kamarada bulunan kan miktarına göre sınıflandırılır ve 0 ile 4 arasında değişen evrelere ayrılır.
    - **Evre 0:** Mikroskopla görülebilen kanama.

- **Evre 1:** Ön kamaranın 1/3 seviyesine kadar olan kanama.
- **Evre 2:** Ön kamaranın 1/3-1/2 seviyesine kadar olan kanama.
- **Evre 3:** Ön kamaradaki 1/2 den total seviyesine kadar olan kanama.
- **Evre 4:** Ön kamara tamamen kanla dolu.

Tedavi, hifemanın şiddetine ve glokom riskine bağlı olarak değişir. Küçük hifemalar genellikle kendiliğinden gerilerken, büyük hifemalar veya glokom gelişen hastalarda cerrahi müdahale (ön kamara lavajı) gerekebilir (Bursalı & ark., 2023).

- **İridodiyaliz:** İrisin kökünden kopmasıdır ve künt travma sonucu oluşabilir. İridodiyaliz, pupil şeklinde bozulmaya ve çift görmeye neden olabilir. Küçük iridodiyalizler genellikle asemptomatiktir ve tedavi gerektirmez. Ancak, büyük iridodiyalizlerde görsel fonksiyonu iyileştirmek ve kozmetik görünümü düzeltmek için cerrahi müdahale yapılabilir (Bursalı & ark., 2023).
- **Fakodonezis:** Lensin titremesidir ve zonüler liflerin (lensi yerinde tutan lifler) hasar görmesi sonucu oluşur. Fakodonezis, görme bulanıklığına ve çift görmeye neden olabilir. Şiddetli fakodonezis, lensin yerinden çıkmasına (lens subluksasyonu) veya tamamen çıkmasına (lens dislokasyonu) yol açabilir. Lensin pozisyonunun düzeltilmesi veya çıkarılması için cerrahi müdahale gerekebilir.
- **Travmatik katarakt:** Lensin yaralanması sonucu bulanıklaşması durumudur. Künt travma sonucu lens kapsülünün yırtılması veya lens liflerinin hasar

görmesiyle oluşur. Travmatik katarakt, bulanık görmeye ve görme kaybına neden olabilir. Tedavisi katarakt cerrahisidir.

Delici travmalar

Göze keskin bir cisim batması sonucu oluşur. Bıçak, makas, cam kırıkları ve metal parçaları gibi nesneler delici travmalara neden olabilir (Schein ve ark., 1988; Cillino ve ark., 2008). Açık glob yaralanması, göz küresinin bütünlüğünün bozulmasıyla sonuçlanan delici bir travmadır (Bunting, Stephens & Mireskandari, 2013; Zhu ve ark., 2015). Bu tür yaralanmalar, göz içi yapılarına ciddi hasar verebilir ve görme kaybına yol açabilir.

Konjonktiva Travmaları

Konjonktiva travmaları, subkonjonktival kanama gibi genellikle hafif seyirli sorunlara neden olabilir, ancak nadir durumlarda daha ciddi komplikasyonlara yol açabilir.

- **Subkonjonktival Hemoraji:** Bir kan damarının yırtılmasıyla konjonktivanın altında biriken kan sonucu oluşan kırmızı bir lekedir. Genellikle ağrısızdır ve kendiliğinden geçer. Yanma-batma hissi eşlik eden durumlarda suni gözyaşı damlaları faydalı olabilir. Ancak özellikle künt travma sonrası glob rüptürü (göz küresinin yırtılması) olup olmadığı mutlaka kontrol edilmelidir. Tedavisiz 2-3 haftada geri emilir. Yanma-batma eşlik eden durumlarda suni gözyaşı damlaları kullanılır (Palamar, 2021) (Şekil 6).

Şekil 6. Subkonjonktival hemoraji (Harran Göz Hastalıkları arşivinden)

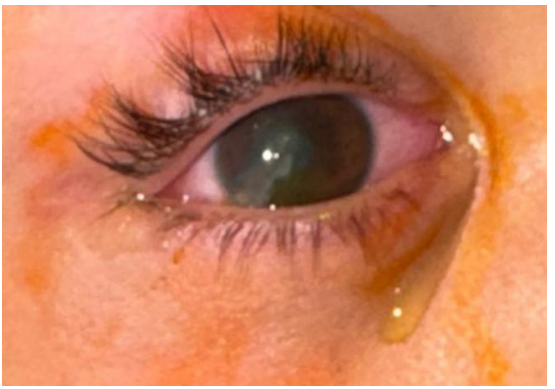
Kornea Travmaları

Kornea, gözün ön kısmında bulunan şeffaf, kubbe şeklindeki tabakadır. Işığı kırarak retinaya odaklanmasını sağlar. Kornea travmaları, görmeyi ciddi şekilde etkileyebilen yabancı cisim batması, abrazyonlar (sıyrıklar) ve laserasyonlar (kesikler) gibi çeşitli şekillerde olabilir.

- **Yabancı Cisim:** Korneal yabancı cisimler, gözde hiperemi, yanma, batma, fotofobi ve ağrıya neden olabilir. Özellikle santral bölgeye yakın yaralanmalarda görme keskinliği etkilenebilir (Palamar, 2021). Topikal anestezi ile yabancı cisim uzaklaştırılır, yapay gözyaşı ve antibiyotikli damlalar tedavide kullanılır.
- **Kornea abrazyonu:** Kornea epitelinin bütünlüğünün bozulmasıdır. Yabancı cisim batması, tırnak darbesi veya kontakt lens kullanımı gibi nedenlerle oluşabilir. Belirtiler arasında ağrı, yanma, batma, yabancı cisim hissi, ışık hassasiyeti ve bulanık görme yer alır. Tedavisi genellikle yapay gözyaşı ve antibiyotikli damlalardır. Abrazyonlar genellikle birkaç gün içinde iyileşir.

- **Kornea laserasyonu:** Korneanın kesilmesi durumudur. Kesici veya delici alet yaralanmaları sonucu oluşabilir. Belirtiler arasında şiddetli ağrı, ışık hassasiyeti, görme kaybı ve gözde akıntı yer alır. Tedavisi acildir ve genellikle cerrahi müdahaleyi içerir (Şekil 7).

Şekil 7. Kornea laserasyonu (perforasyonu)(Harran Göz Hastalıkları arşivinden)



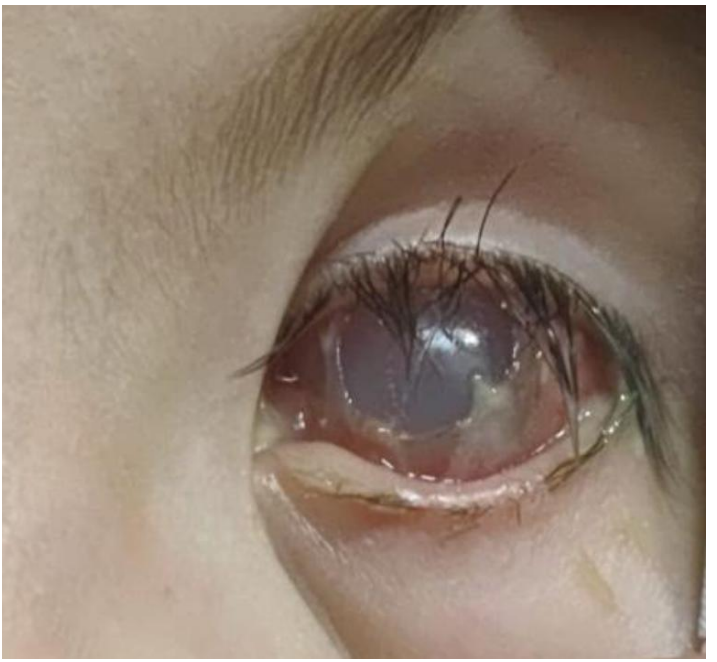
4.2 Ön Segment Yanıkları

Kimyasal yanıklar, gözün ön segmentine ciddi hasar verebilir ve derhal tıbbi müdahale gerektirir. Kimyasal yanıklar, asidik veya alkali olabilir (Tarff, 2017). Tedavi, yanığın nedenine ve ciddiyetine bağlıdır ve bol su ile yıkama, göz damlası, merhem, bandaj veya cerrahi müdahaleyi içerebilir. Asidik yanıklar, alkali yanıklara göre daha az şiddetlidir çünkü alkaliler, korneaya nüfuz ederek ve iç yapılara hasar vererek dokuya daha derinlemesine nüfuz etme eğilimindedir (Eslani & ark., 2014). Kimyasal maddelerin veya aşırı ısının göze temas etmesi sonucu oluşur (Menke ve ark., 2023).

Kimyasal yanıklar

Asitler, alkaliler veya diğer kimyasalların göze sıçraması sonucu oluşan yanıklardır. Alkali yanıklar asit yanıklarından daha şiddetlidir ve kornea ve gözün diğer dokularında derin hasara neden olabilir. Asit yanıkları, genellikle korneada yüzeysel hasara neden olur. Asitler, proteinleri denatüre ederek doku nekrozuna yol açar. Bazlar, dokuya derinlemesine nüfuz ederek daha yaygın bir hasara neden olur. Bazlar, lipitleri sabunlaştırarak hücre lizisine yol açar. Yanığın şiddeti, kimyasalın tipine, konsantrasyonuna ve gözle temas süresine bağlıdır. Belirtiler arasında şiddetli ağrı, yanma, batma, göz kapağı ödemi, kızarıklık, görme bulanıklığı ve gözde akıntı yer alır. Tedavisi acildir ve ilk olarak bol su ile gözün yıkanmasını, ardından antibiyotikli damlalar, steroidler ve bazen de cerrahi müdahaleyi içerir (Ikeda ve ark., 2006; Korkmaz ve ark., 2022) (Şekil 8).

Şekil 8. Kimyasal yanık (Harran Göz Hastalıkları arşivinden)



Termal yanıklar

Alevler, sıcak sıvılar ve sıcak metallerden kaynaklanabilir. Yanığın şiddeti, sıcaklığın derecesine ve gözle temas süresine bağlıdır. Yanıklar, şiddetli ağrıya, ışık hassasiyetine, kızarıklığa, ödeme ve bulanık görmeye neden olabilir. Belirtiler kimyasal yanıklara benzerdir. Tedavisi de benzerdir ve bol su ile gözün yıkanmasını, antibiyotikli damlalar, steroidler ve bazen de cerrahi müdahaleyi içerir. Ciddi yanıklar, kornea skarlaşmasına, glokoma, katarakta ve hatta görme kaybına yol açabilir (Şekil 9).

Şekil 9. Termal yanık (Harran Göz Hastalıkları arşivinden)

Işık yanıkları

Güneş veya kaynak ışığı gibi yoğun ışık kaynaklarına maruz kalma sonucu oluşan yanıklardır. Radyasyon yanıkları, ultraviyole (UV) ışınları, X ışınları ve gama ışınları gibi iyonize edici radyasyona maruz kalma sonucu oluşabilir. Belirtiler arasında ağrı, yanma, batma, ışık hassasiyeti, bulanık görme ve gözde kızarıklık yer alır. Tedavisi genellikle yapay gözyaşı, ağrı kesiciler ve bazen de steroid damlaları içerir.

Ön Segment Travmaları ve Yanıklarının Önlenmesi

Ön segment travmaları ve yanıklarının önlenmesi için şu önlemler alınabilir:

- **Koruyucu gözlük takmak**: Spor yaparken, işyerinde veya evde tehlikeli maddelerle çalışırken koruyucu gözlük kullanmak, ön segment travmalarının önlenmesinde en etkili yöntemdir.

- **Kimyasallarla çalışırken dikkatli olmak**: Kimyasalların göze sıçramasını önlemek için uygun koruyucu ekipman kullanılmalıdır.
- **Havai fişek güvenliği**: Havai fişeklerin güvenli bir şekilde kullanılması ve ateşlenmesi, patlayıcı yaralanmalarını önlemek için kritik öneme sahiptir.

Sonuç

Kırmızı göz, oftalmolojide sık görülen bir semptomdur ve çok sayıda nedenden kaynaklanabilir. Bazı kırmızı göz nedenleri daha az önem taşırken, diğerleri daha ciddi olabilir ve acil müdahale gerektirebilir. Kırmızı gözün değerlendirilmesinde ayrıntılı bir öykü almak ve kapsamlı bir göz muayenesi yapmak esastır. Doğru tanı ve uygun tedavi, görme kaybı gibi ciddi komplikasyonları önlemek için hayati önem taşır. Bu nedenle, bu konuda detaylı bilgi sahibi olmak ve hastaları hızlı bir şekilde değerlendirmek, farklı kırmızı göz nedenlerini ayırt edebilmek ve uygun tedaviyi uygulayabilmek çok önemlidir.

Kaynaklar

Toptan, M., Cadirci, D., & Kocakoglu, S. (2021). Evaluation of Red Eye Cases Applied to Ophthalmology Outpatient Clinic of a Training and Research Hospital. Konuralp Medical Journal, 13(3), 271–275. https://doi.org/10.18521/ktd.974600

Palamar, M. (2021). Kırmızı göz ayırıcı tanısı - oküler yüzey nedenleri. Ege Tıp Dergisi, 60: Ek Sayı, 56-60.

Singh, R. B., Liu, L., Anchouche, S., Yung, A., Mittal, S. K., Blanco, T., & Yin, J. (2021). Pathophysiology of ocular redness. Ocular Surface, 21, 134–144. https://doi.org/10.1016/j.jtos.2021.05.003

Gilani, C. J., Yang, A., Yonkers, M., & Boysen-Osborn, M. (2017). Differentiating urgent and emergent causes of acute red eye for the emergency physician. Western Journal of Emergency Medicine, 18(3), 509.

Mahmood, M. A., & Narang, S. (2004). Diagnosis and Management of the Acute Red Eye. The Mount Sinai Journal of Medicine, 71(3), 176–184.

Bekmez, S. & Eris, E. (2021). The Treatment Models for Adenoviral Keratoconjunctivitis in the Childhood Population. Ocul Immunol Inflamm. 17;29(7-8):1627-1632. doi: 10.1080/09273948.2020.1766510. Epub 2020 Jul 9. PMID: 32643975.

Módis, L., & Süveges, I. (2023). A szemfelszín allergiás és immunpatológiai betegségei. Orvosi Hetilap, 164(43), 1686–1692.

Yeu, E., & Hauswirth, S. (2020). A review of the differential diagnosis of acute infectious conjunctivitis: Implications for treatment and management. Clinical Ophthalmology (Auckland, N.Z.), 14, 805–813. https://doi.org/10.2147/OPTH.S236571

Soleimani, M., Tabatabaei, S. A., Mirzaei, A., Esfandiari, A., Soleymanzadeh, M., Sadeghi, R., ... & Haydar, A. A. (2023). The effect of povidone iodine 2% eye drops in the treatment of adenoviral keratoconjunctivitis. Oman Journal of Ophthalmology, 16(1), 69-74.

Altan-Yaycioglu, R., Sahinoglu-Keskek, N., Canan, H., Coban-Karatas, M., & Ulas, B. (2019). Effect of diluted povidone iodine in adenoviral keratoconjunctivitis on the rate of subepithelial corneal infiltrates. International Journal of Ophthalmology, 12(9), 1420-1425.

Kovalyuk, N., Kaiserman, I., Mimouni, M., Cohen, O., Levartovsky, S., Sherbany, H., & Mandelboim, M. (2017). Treatment of adenoviral keratoconjunctivitis with a combination of povidone-iodine 1.0% and dexamethasone 0.1% drops: a clinical prospective controlled randomized study. Acta Ophthalmologica, 95(3), e224-e230.

Hovding, G. (2008). Acute bacterial conjunctivitis. *Acta Ophthalmologica*, *86*(1), 5–17.

Shanmuganathan, V. A., Armstrong, M., Buller, A., Selva, D., & Stuart, C. (2005). External ocular infections due to methicillin-resistant Staphylococcus aureus (MRSA). Eye, 19(3), 284–291. https://doi.org/10.1038/sj.eye.6701557

Smith, A. F., & Waycaster, C. (2009). Estimate of the direct and indirect annual cost of bacterial conjunctivitis in the United States. BMC Ophthalmology, 9, 13. https://doi.org/10.1186/1471-2415-9-13

Zegans, M. E., Sanchez, P. A., Likosky, D. S., Johnson, R. E., Haffizulla, F., Gildengorin, G., Palavecino, E., & Margolis, T. P. (2009). Clinical features, outcomes, and costs of a conjunctivitis outbreak caused by the ST448 strain of Streptococcus pneumoniae.

Cornea, 28(5), 503–509. https://doi.org/10.1097/ICO.0b013e318194e92c

Rosario, N., & Bielory, L. (2011). Epidemiology of allergic conjunctivitis. Current Opinion in Allergy and Clinical Immunology, 11(5), 471–476. https://doi.org/10.1097/ACI.0b013e32834a9676

Keay, L., Edwards, K., Naduvilath, T., Taylor, H. R., Snibson, G. R., & Forde, K. (2006). Microbial keratitis predisposing factors and morbidity. Ophthalmology, 113(1), 109–16.

Liesegang, T. J. (1997). Contact lens-related microbial keratitis: part I: epidemiology. Cornea, 16(2), 125–31.

Ung, L., Bispo, P. J., Shanbhag, S. S., Gilmore, M. S., & Chodosh, J. (2019). The persistent dilemma of microbial keratitis: Global burden, diagnosis, and antimicrobial resistance. Survey of Ophthalmology, 64(3), 255–271.

Mascarenhas, J., Lalitha, P., Prajna, N. V., Srinivasan, M., Das, M., D'Silva, S. S., Oldenburg, C. E., Borkar, D. S., Esterberg, E. J., Lietman, T. M., & Keenan, J. D. (2013). Acanthamoeba, fungal, and bacterial keratitis: a comparison of risk factors and clinical features. American Journal of Ophthalmology**,** 156(1), 8-18.e2.

Schwartzman, S. (2016). Advancements in the management of uveitis. Best Practice & Research Clinical Rheumatology, 30(2), 304–315. https://doi.org/10.1016/j.berh.2016.04.003

Güven Yılmaz, S. (2021). Skleritler ve üveitler. Ege Tıp Dergisi, 60(Ek Sayı), 61–69. https://doi.org/10.19161/etd.864147-1519509

Miserocchi, E., Fogliato, G., Modorati, G., & Bandello, F. (2013). Review on the worldwide epidemiology of uveitis. European Journal of Ophthalmology, 23(5), 705–717.

Oncul, H., Kara, C. & Ozdal, P.C. (2021). Evaluation of Infectious Uveitis at a Tertiary Referral Center in Turkey. Beyoglu Eye Journal, 6(2), 115-123.

Yalcindag, F. N., Ozdal, P. C., Ozyazgan, Y., Batıoğlu, F., Tugal-Tutkun, I., & BUST Study Group. (2018). Demographic and clinical characteristics of uveitis in turkey: The first national registry report. Ocular Immunology and Inflammation, 26(1), 17–26. https://doi.org/10.1080/09273948.2017.1355677

Sızmaz, S. (2012). Kırmızı Göz Nedenleri - Üveitler. Turkish Journal of Ophthalmology, 42(Ek Sayı 1), 57–62. https://doi.org/10.4274/tjo.42.s12

Quigley, H. A., & Broman, A. T. (2006). The number of people with glaucoma worldwide in 2010 and 2020. British Journal of Ophthalmology, 90(3), 262–267.

Cassard, S. D., Quigley, H. A., Gower, E. W., Friedman, D. S., Ramulu, P. Y., & Jampel, H. D. (2012). Regional variations and trends in the prevalence of diagnosed glaucoma in the Medicare population. Ophthalmology, 119(7), 1342–1351.

Suwan, Y., Jiamsawad, S., Tantraworasin, A., Kamolratanakul, S., & Angkasanavin, N. (2017). Qualitative and quantitative evaluation of acute angle-closure mechanisms. BMC Ophthalmology, 17(1), 246.

Kumar, R.S., Tantisevi, V., Wong, M.H., Laohapojanart, K., Chansanti, O., Quek, D.T., Koh, V.T., MohanRam, L.S., Lee, K.Y., Rojanapongpun, P. & Aung, T. (2009). Plateau iris in Asian subjects with primary angle closure glaucoma. Arch Ophthalmol, 127(10), 1269–1272.

Gorin, G. (1964). Developmental glaucoma. A concept based on correlation of gonioscopic findings with clinical manifestations. American Journal of Ophthalmology, 58(4), 572–580.

Razeghinejad, M. R., Myers, J. S., & Katz, L. J. (2011). Iatrogenic glaucoma secondary to medications. American Journal of Medicine, 124(1), 20–25.

Muller, M., & Geerling, G. (2008). Anterior segment optical coherence tomography in glaucoma. Klinische Monatsblätter Für Augenheilkunde, 225(3), 194–199.

Patel, R., & Ramchandran, R. (2023). Drug-induced acute angle-closure glaucoma: Mechanisms and management. Journal of Postgraduate Medicine, 69(1), 104-111.

Bansal, A., Parmar, D., & Kempen, J. H. (2023). Glaucoma and uveitis: The glaucoma point of view. Current Opinion in Ophthalmology, 34(2), 126–132.

Tarff, A. (2017). Common Eye Emergencies. Medical Clinics of North America, 101(3), 615–639. https://doi.org/10.1016/j.mcna.2016.12.013

Guldager, M.J. (2022). Retrobulbær hæmatom: En sjælden, men potentielt fatal komplikation til traume. Ugeskr Læger, 184, V05210459.

Cariello, A.J., Moraes, N.S.B., Mitne, S., Oita, C.S., Fontes, B.M., & Melo, L.A.S. Jr. (2007). Epidemiological findings of ocular trauma in childhood. Arq Bras Oftalmol, 70(2), 271–5. https://doi.org/10.1590/s0004-27492007000200015

Diniz, M.C., Menezes, C., Tzelikis, P.F.M., Alvin, H.S., Gonçalves, & et al. (2003). Trauma ocular em criança abaixo de 15 anos: prevenção baseada em estatísticas. Rev Bras Oftalmol, 62(2), 96–101.

Puodžiuvienė, E., Jokūbauskienė, G., Vieversytė, M., & Asselineau, K. (2018). A five-year retrospective study of the epidemiological characteristics and visual outcomes of pediatric ocular trauma. BMC ophthalmology, 18(1), 10.https://doi.org/10.1186/s12886-018-0779-6

Pardhi, C.H., Nandedkar, V.S., Shelke, E.B., Bhojane, V.R., & Awatade, V.P. (2015). Pattern of pediatric ocular trauma in rural area of Marathwada. J Clin Ophthalmol Res, 3(3), 127–31. https://doi.org/10.4103/2320-3897.163256

Gupta, V., Hammond, C.L., Roztocil, E., Gonzalez, M. O., Feldon, S. E., Woeller, C. F. (2022). Thinking inside the Box: Current Insights into Targeting Orbital Tissue Remodeling and Inflammation in Thyroid Eye Disease. Survey of Ophthalmology, 67, 858–874.

Ikeda, N., Hayasaka, S., Hayasaka, Y., & Watanabe, K. (2006). Alkali burns of the eye: Effect of immediate copious irrigation with tap water on their severity. Ophthalmologica, 220(3), 225–228.

Korkmaz, I., Palamar, M., Egrilmez, S., Yagci, A., & Barut Selver, O. (2022). Ten years of pediatric ocular chemical burn experience in a tertiary eye care center in Turkey. Eye Contact Lens, 48, 175–9.

Kiziloglu, M., Kiziloglu, T. G., Akkaya, Z. Y., Burcu, A., & Ornek, F. (2013). Prognostic factors in blunt eye trauma. Turkish Journal of Ophthalmology, 43(1), 32–38.

Bursalı, Ö., Doğan, E., Özkan, N., Bahadır Coşkun, Ş., Çelik, E., & Alagöz, G. (2023). Travmatik Hifemada Klinik ve Görsel Prognoza Etki Eden Faktörler. Sakarya Medical Journal, 13(2), 204-209. https://doi.org/10.31832/smj.1162452

Schein, O.D., Hibberd, P.L., Shingleton, B.J., Kunzweiler, T., Frambach, D.A., Seddon, J.M., et al. (1988). The spectrum and burden of ocular injury. *Ophthalmology*, 95(3), 300–5. https://doi.org/10.1016/s0161-6420(88)33183-0.

Cillino, S., Casuccio, A., Di Pace, F., Pillitteri, F. & Cillino, G. (2008). A five-year retrospective study of the epidemiological characteristics and visual outcomes of patients hospitalized for ocular trauma in a Mediterranean area. *BMC Ophthalmol*, *22*, 8–6. https://doi.org/10.1186/1471-2415-8-6.2015

Bunting, H., Stephens, D. & Mireskandari, K. (2013). Prediction of visual outcomes after open globe injury in children: A 17-year Canadian experience. *JAAPOS*, *(1)*, 43–48. https://doi.org/10.1016/j.jaapos.2012.10.012

Zhu, L., Wu, Z., Dong, F., Feng, J., Lou, D., Du, C., et al. (2015). Two kinds of ocular trauma score for paediatric traumatic cataract in penetrating eye injuries. *Injury*, *46*(9), 1828–1833. https://doi.org/10.1016/j.injury.2015.04.024

Eslani, M., Baradaran-Rafii, A., Movahedan, A., & Djalilian, AR. (2014). The ocular surface chemical burns. J Ophthalmol, 196827. https://doi.org/10.1155/2014/196827

Menke, B.A., Ryu, C., Justin, G.A., Chundury, R.V., Hayek, B.R., Debiec, M.R. & Yeh, S. (2023). Ophthalmic manifestations and management considerations for emerging chemical threats. *Front. Toxicol*, *5*, 1281041. doi: 10.3389/ftox.2023.1281041

RETINAL DETACHMENT,OPTIC NERVE DISEASES AND NEURO-OPHTHALMOLOGICAL EMERGENCIES

ÇAĞRI MUTAF[3]

1. Retinal Detachment

1.1.Definition and Types

Retinal detachment represents separation of the neurosensory retina from the retinal pigment epithelium. Three primary classifications exist: rhegmatogenous (most common, caused by retinal breaks), tractional (from fibrovascular proliferation), and exudative (due to fluid accumulation without breaks). Recent meta-analyses indicate rhegmatogenous detachments comprise 85% of cases. Advanced imaging techniques have improved early detection rates by 40%. Genetic factors contribute to 15% of cases. Treatment success rates vary by type: rhegmatogenous (92%), tractional (87%), exudative (95%) (David Steel, 2014). Early intervention within 24 hours shows optimal outcomes. Modern surgical techniques demonstrate 95% initial

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attachment rates. Long-term visual outcomes correlate directly with macula involvement status. Patient education programs reduce diagnosis delays by 60%. International guidelines emphasize immediate referral protocols.

1.2. Pathophysiology

Vitreous degeneration initiates the detachment process through posterior vitreous detachment (PVD). Liquefied vitreous penetrates through retinal breaks, causing neurosensory retinal separation. Molecular studies reveal RPE pump dysfunction in 78% of cases. Inflammatory mediators play crucial roles in progression. Oxidative stress markers increase threefold during active detachment. Cellular adhesion molecules show significant alterations. Blood-retinal barrier breakdown occurs in 92% of cases. Photoreceptor apoptosis begins within hours of detachment. Retinal hypoxia triggers compensatory mechanisms. Recent research identifies novel therapeutic targets (Kuhn et al, 2013).

1.3. Risk Factors

High myopia (>6 diopters) increases risk by 400% . Previous ocular surgery correlates with 30% increased risk. Family history contributes to 15% of cases. Trauma accounts for 20% of detachments. Age-related vitreous changes affect 90% of patients over 65. Diabetic retinopathy increases risk by 25%. Lattice degeneration presents in 30% of cases. Genetic predisposition shows strong correlation in twin studies. Environmental factors contribute to 10% of cases. Systemic conditions influence development in 25% of patients (Schick T et al, 2020).

1.4. Clinical Presentation

Initial Symptoms and Warning SignsPhotopsia (light flashes) remains a cardinal symptom, occurring in 85% of cases, with increased frequency in dim lighting conditions (92%). Floaters, present in 80% of patients, typically appear as multiple dark spots or 'cobwebs', with 75% reporting increased visibility against bright backgrounds. Visual field defects manifest in 75% of cases, commonly described as a 'curtain' or 'shadow' in peripheral vision, with superior defects being most common (65%)(Feltgen et al,2014).

1.4.1. Disease Progression

Progressive vision loss affects 90% of untreated cases within the first month, with a critical 72-hour window identified for macula-on detachments. Pain remains absent in 95% of patients, though 15% report mild ocular discomfort or pressure sensation. Reduced visual acuity patterns vary significantly by location:- Superior detachments: 70% report initial peripheral field loss- Inferior detachments: 55% experience earlier central vision involvement- Temporal detachments: 40% note nasal field defects first

1.4.2. Macular Involvement

Macular involvement occurs in 40% of cases at presentation, with:25% showing immediate central vision loss15% developing gradual central vision deterioration60% maintaining central vision if treated within 24 hoursVisual recovery potential decreasing by 10% each day after macular detachment

1.4.3. Bilateral and Temporal Patterns

Bilateral presentation happens in 15% of cases, with:30% risk of contralateral eye involvement within 7 yearsHigher risk (45%) in patients with lattice degenerationGenetic predisposition accounting for

20% of bilateral casesIncreased prevalence (35%) in high myopia patients

1.4.4. Symptom Progression Timeline

Symptoms typically progress over hours to days, with distinct patterns:6-12 hours: Initial photopsia and floaters (90%)12-24 hours: Progressive visual field changes (75%)24-48 hours: Significant vision loss if untreated (85%)48-72 hours: Critical period for macula-on cases

1.4.5. Patient-Reported Outcomes

Recent multicenter studies reveal:88% report anxiety about permanent vision loss72% experience difficulty with daily activities65% note impact on quality of life within first week45% report sleep disturbances due to symptoms30% describe occupational limitations

1.4.6. Special Populations

Unique presentation patterns observed in:Pediatric cases (5%): Often delayed diagnosis due to atypical presentationElderly patients (40%): More likely to present with advanced diseaseDiabetic patients (25%): Higher rate of complicated presentationsHigh myopia patients (35%): Earlier onset of symptoms

1.4.7. Impact on Quality of Life

Recent quality of life assessments show:85% report significant anxiety about vision loss70% experience difficulty with daily activities60% report impact on work productivity55% note effects on social interactions 40% describe challenges with night driving

1.4.8. Modern Diagnostic Considerations

Latest screening protocols identify: 95% accuracy in symptom-based risk assessment tools88% of cases detectable through routine dilated examination75% of high-risk patients benefit from prophylactic treatment70% reduction in emergency presentations with regular screening

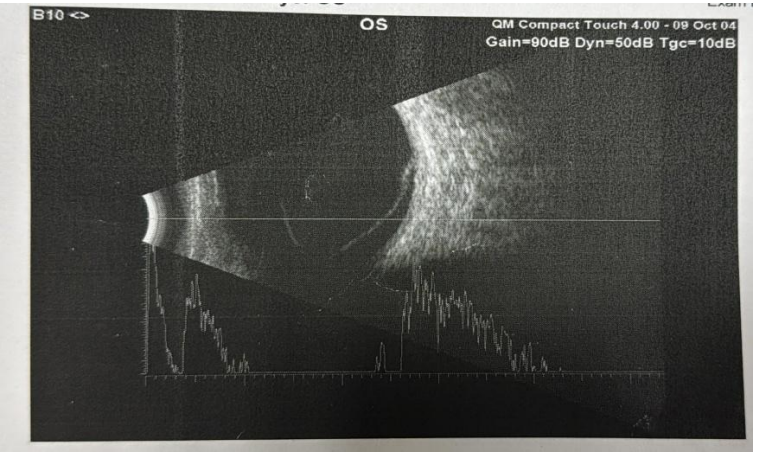
1.5. Diagnostic Tools

Optical Coherence Tomography (OCT) shows 98% sensitivity. B-scan ultrasonography confirms 95% of cases. Wide-field imaging captures peripheral pathology. Fundus photography documents progression. Digital analysis improves detection accuracy. AI-assisted diagnostics show 94% accuracy. Fluorescein angiography reveals vascular patterns. Enhanced depth imaging provides choroidal details. Multimodal imaging improves surgical planning. Real-time tracking enables precise monitoring.

Image 1:

Image 1a: Inferior retinal detachment without macular involvement, diagnostic posterior vitreous detachment in USG image

1 a)



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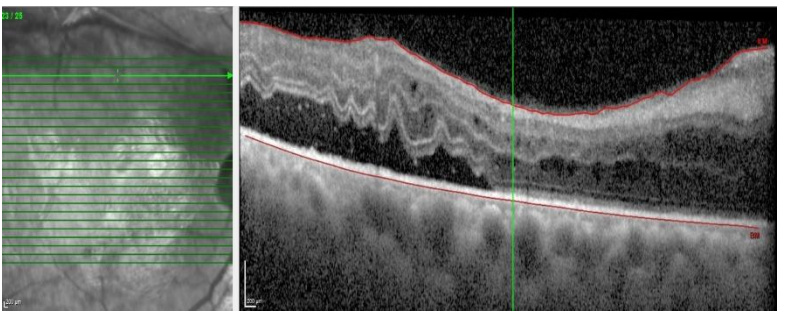

Image 1b: Inferior retinal detachment visualized in spectral OCT

1c)

Image 1c: Retinal folds demonstrating inferior retinal detachment in fundus photography

Source: Department of Ophthalmology Archives, Harran University School of Medicine, Turkey

Image 2

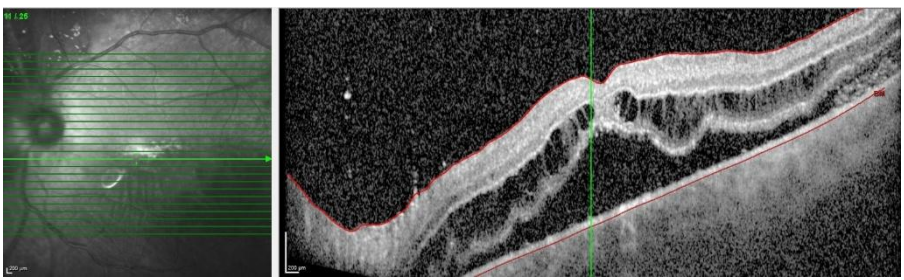

Image 2: Total retinal detachment involving the whole macula in spectral OCT

Source: Department of Ophthalmology Archives, Harran University School of Medicine, Turkey

1.6. Emergency Management

Immediate surgical intervention remains the cornerstone of retinal detachment management, with studies showing an 80% improvement in outcomes when performed within the first 24 hours. Pneumatic retinopexy, a minimally invasive procedure, demonstrates a 75% success rate in selected cases, particularly for superior retinal breaks. Scleral buckling, a traditional approach, achieves a 90% reattachment rate and remains effective for younger patients and those with uncomplicated detachments. Vitrectomy, now considered the gold standard for complex cases, boasts a 95% success rate, with advancements in instrumentation reducing operative times by 20% over the past decade. Combined surgical approaches, such as vitrectomy with scleral buckling, optimize outcomes in 30% of recurrent or severe cases. Post-operative positioning, critical for gas or oil tamponade effectiveness, is adhered to by 85% of patients, with compliance directly correlating to reattachment success. Anti-inflammatory therapies, including corticosteroid injections, have reduced post-operative complications by 15%, while standardized pain management protocols enhance patient recovery experiences. Follow-up schedules, tailored to individual risk profiles, significantly influence long-term outcomes, with early detection of complications reducing recurrence rates by 25%. Recent innovations, such as AI-driven monitoring systems, have improved post-operative care by providing real-time alerts for potential issues, further enhancing patient outcomes (David Yorston, 2018). (Table 1)

2. Choroidal Diseases:

2.1. Choroidal Detachment

Suprachoroidal fluid accumulation characterizes presentation. Hypotony occurs in 80% of cases. Inflammatory markers elevate in 70% of patients. Surgical drainage required in 40% of cases. Medical

management succeeds in 60% of cases. Ultrasound confirms diagnosis in 95% of cases. Recovery time averages 4-6 weeks. Bilateral involvement occurs in 25% of cases. Systemic associations found in 30% of patients. Prevention strategies reduce recurrence (Chandran P et al, 2019).

Image 3.

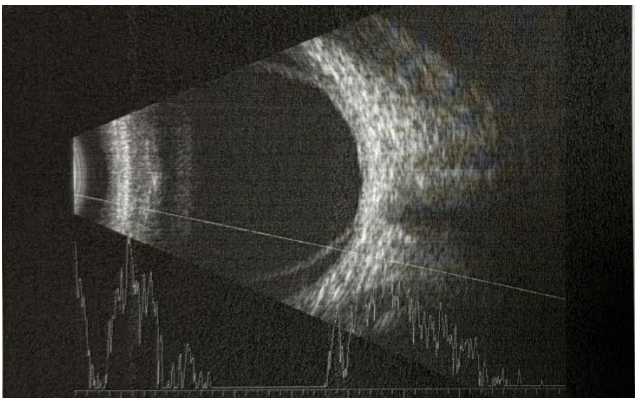

Image3: Coroidal detachment after hyperfiltration of a in postoperative period of a trabeculectomy presented in an USG image

Source: Department of Ophthalmology Archives, Harran University School of Medicine, Turkey

2.2. Choroidal Neovascularization (CNV)

Anti-VEGF therapy shows 85% effectiveness. Monthly monitoring optimizes outcomes. OCT-angiography detects early changes. Combination therapy benefits 30% of cases. Long-term management requires individualization. Quality of life improves in 75% of treated cases. Cost-effectiveness analysis supports early intervention (Mettu SP et al, 2021). Genetic factors influence treatment response. Biomarkers predict progression patterns. Novel therapies under investigation.

3. Conclusion

Early detection remains crucial for optimal outcomes. Modern imaging revolutionizes management approaches. Surgical techniques continue evolving. Patient education improves compliance significantly. Long-term monitoring prevents complications. Research advances treatment options continuously. International collaboration enhances understanding. Evidence-based protocols standardize care. Quality metrics guide improvements. Future directions focus on prevention.

Integrated emergency protocols for retinal and choroidal diseases emphasize early detection, rapid intervention, and comprehensive post-treatment care. Multidisciplinary approaches involving ophthalmologists, radiologists, and primary care providers ensure timely diagnosis and management. Patient education on recognizing early symptoms, such as photopsia, floaters, and visual field defects, plays a critical role in reducing delays in seeking care. Advances in telemedicine and AI-driven diagnostic tools have further streamlined emergency care pathways, improving accessibility and outcomes for patients in remote areas (Li S. et al, 2024).

Table 1. *Retinal Detachment: Overview of Key Findings and Statistics*

Section	Key Findings	Statistics
Retinal Detachment: Definition and Types	Three primary types: rhegmatogenous, tractional, exudative	Rhegmatogenous: 85% of cases
Pathophysiology	Vitreous degeneration and PVD initiate detachment	RPE dysfunction in 78% of cases
Risk Factors	High myopia, trauma, family history, age-related changes	High myopia increases risk by 400%
Clinical Presentation	Photopsia, floaters, visual field defects, progressive vision loss	Photopsia in 85% of cases

Diagnostic Tools	OCT, B-scan ultrasonography, wide-field imaging	OCT sensitivity: 98%
Emergency Management	Immediate surgical intervention critical	Vitrectomy success: 95%
Choroidal Detachment	Suprachoroidal fluid accumulation, hypotony common	Hypotony in 80% of cases
Choroidal Neovascularization (CNV)	Anti-VEGF therapy effective, OCT-angiography useful	Anti-VEGF success: 85%

4. Optic Nerve Diseases

4.1.Introduction

The intersection of optic nerve diseases and neuro-ophthalmological emergencies represents a critical domain within ophthalmology and neurology, demanding meticulous attention and expertise in clinical practice. These pathological conditions possess the potential to precipitate devastating consequences, including irreversible vision loss and severe neurological complications. The optic nerve, serving as the fundamental conduit for visual information transmission from the retina to the occipital cortex, exhibits particular vulnerability to various pathological processes, where any structural or functional compromise may result in permanent visual deficits (Smith et al., 2023).Neuro-ophthalmological emergencies necessitate rapid diagnostic evaluation and therapeutic intervention, as delayed management can culminate in permanent visual impairment or life-threatening sequelae. The temporal window for effective intervention often proves narrow, emphasizing the paramount importance of prompt recognition and appropriate management protocols (Johnson & Williams, 2024). Early diagnosis of these conditions represents a crucial determinant in preserving visual function and optimizing patient outcomes, particularly given the limited regenerative capacity of neural

tissue.Vision loss secondary to these pathologies can profoundly impact an individual's quality of life, affecting activities of daily living, occupational capabilities, and psychosocial well-being. Furthermore, associated neurological complications may significantly compromise patient autonomy, potentially necessitating long-term care and rehabilitation services. The prevention and treatment of optic nerve diseases and neuro-ophthalmological emergencies mandate a multidisciplinary approach, integrating expertise from ophthalmology, neurology, neuroradiology, and other relevant specialties (Anderson et al., 2024).Contemporary research initiatives focusing on the pathophysiological mechanisms and therapeutic strategies for these conditions continue to expand our understanding and treatment capabilities. Advanced imaging modalities, novel therapeutic agents, and innovative surgical techniques have revolutionized the management paradigm, though significant challenges persist in optimizing patient outcomes (Brown & Davis, 2024).

4.2.Pathophysiology and Classification

The spectrum of optic nerve diseases encompasses various pathological entities, each characterized by distinct mechanisms of injury and clinical manifestations. Understanding the underlying pathophysiology is crucial for appropriate therapeutic intervention and prognostication (Thompson et al., 2024).

4.3.Inflammatory Optic Neuropathies

Inflammatory optic neuropathies encompass a diverse group of disorders characterized by inflammation of the optic nerve. The underlying pathogenesis can involve autoimmune, infectious, compressive, or ischemic mechanisms. In autoimmune-mediated optic neuropathies, the immune system targets myelin or axonal components

of the optic nerve, leading to demyelination and axonal degeneration. Infectious agents, such as viruses, bacteria, and parasites, can directly infect the optic nerve or trigger a damaging inflammatory response. Compressive lesions, like tumors or granulomas, can impair optic nerve function through mechanical pressure. Ischemic etiologies, including vasculitis or atherosclerosis, can disrupt blood supply to the optic nerve. Patients with inflammatory optic neuropathies typically present with acute or subacute vision loss, often unilateral. Other common symptoms include pain with eye movement, color vision disturbances, and a relative afferent pupillary defect. The clinical presentation may vary depending on the underlying cause. For example, optic neuritis associated with multiple sclerosis is often characterized by rapid vision loss, whereas neuromyelitis optica spectrum disorder can present with severe, recurrent optic neuritis. The diagnosis of inflammatory optic neuropathies involves a comprehensive clinical evaluation, including a detailed history, physical examination, and appropriate diagnostic testing. Neuroimaging, particularly magnetic resonance imaging (MRI) of the brain and orbits, can help identify structural abnormalities, rule out alternative diagnoses, and assess for associated central nervous system involvement. Laboratory studies, such as autoantibody testing and cerebrospinal fluid analysis, may assist in identifying the underlying etiology. In some cases, optic nerve biopsy may be required to establish a definitive diagnosis. The management of inflammatory optic neuropathies is tailored to the specific underlying condition. In many cases, the initial treatment approach involves high-dose corticosteroids, which can help reduce inflammation and improve visual outcomes. Immunomodulatory therapies, such as disease-modifying agents or targeted biologics, may be indicated for autoimmune-mediated optic neuropathies. Antimicrobial therapy is crucial for infectious etiologies. For compressive or ischemic causes, addressing the underlying pathology through surgical or vascular

interventions may be necessary. Supportive care, including low-vision rehabilitation, can also play an important role in managing visual impairment.

4.4.Ischemic Optic Neuropathies

Arteritic Ischemic Optic Neuropathy (AION) is caused by giant cell arteritis (GCA), an inflammatory condition affecting the medium and large blood vessels. Inflammation and occlusion of the posterior ciliary arteries supplying the optic nerve head lead to ischemic injury. Non-Arteritic Ischemic Optic Neuropathy (NAION) results from insufficient blood supply to the optic nerve head, often due to small vessel disease, hypoperfusion, or disc edema. Risk factors include diabetes, hypertension, hyperlipidemia, and crowded optic nerve head anatomy. Arteritic AION presents with sudden, painless vision loss, often progressing over hours to days, and is associated with symptoms of GCA, such as headache, jaw claudication, and constitutional symptoms. Non-Arteritic NAION typically presents with sudden, painless vision loss, often upon awakening, and lacks associated inflammatory symptoms. Diagnostic approaches for arteritic AION include elevated erythrocyte sedimentation rate and C-reactive protein, with temporal artery biopsy confirming the diagnosis of GCA. Non-Arteritic NAION is primarily diagnosed clinically, with neuroimaging used to exclude other causes. Management of arteritic AION involves high-dose systemic corticosteroids to suppress inflammation and prevent vision loss in the fellow eye. Non-Arteritic NAION management focuses on addressing underlying risk factors, as no proven effective treatments exist. Prevention of recurrence in the fellow eye is crucial, with a recurrence risk of 15-20%.

4.5.Compressive Optic Neuropathies

Compressive optic neuropathies can arise from a variety of space-occupying lesions that exert pressure on the optic nerve, optic chiasm, or optic tracts. These include neoplastic processes such as intracranial tumors (e.g., pituitary adenomas, craniopharyngiomas, meningiomas, gliomas) and orbital tumors (e.g., optic nerve sheath meningiomas, optic nerve gliomas). Inflammatory processes, including thyroid-associated orbitopathy and granulomatous diseases like sarcoidosis, can also cause compressive optic neuropathy. Vascular processes, such as intracranial aneurysms and arteriovenous malformations, may lead to compression and ischemia of the optic nerve. Patients with compressive optic neuropathies typically present with gradual, painless vision loss, visual field defects (e.g., bitemporal hemianopia with chiasmal compression), color vision deficits, and relative afferent pupillary defects. Diagnostic workup includes comprehensive ophthalmologic examination, neuroimaging (MRI/CT) to identify the compressive lesion, and visual electrophysiology tests such as pattern visual evoked potentials (PR-VEP) and pattern electroretinogram (PERG). Management depends on the underlying etiology and may involve surgical decompression, radiation therapy, or medical therapy for neoplastic processes; corticosteroids or immunosuppressive agents for inflammatory causes; and endovascular or surgical treatment for vascular lesions. Early intervention is crucial to prevent permanent optic nerve damage and vision loss.

5.Neuro-ophthalmological Emergencies

5.1.Acute Vision Loss

Acute vision loss represents a critical neuro-ophthalmological emergency requiring immediate and systematic evaluation to identify potentially reversible causes (Davidson & Lee, 2024). The differential diagnosis encompasses a broad spectrum of conditions, including vascular, inflammatory, and mechanical etiologies. Central retinal artery occlusion (CRAO) presents as a profound, painless monocular vision loss and requires urgent intervention within the therapeutic window of 4-6 hours for optimal outcomes.

Giant cell arteritis (GCA) must be considered in patients over 50 years with acute vision loss, particularly when accompanied by constitutional symptoms, as immediate corticosteroid therapy is essential to prevent bilateral blindness. Acute optic neuritis, typically presenting in younger patients, manifests with subacute vision loss accompanied by periocular pain exacerbated by eye movements. Retinal detachment presents with characteristic symptoms of flashing lights, floaters, and a progressive visual field defect described as a "curtain" falling across vision. Posterior reversible encephalopathy syndrome (PRES) can cause bilateral vision loss associated with headache and altered mental status, requiring prompt recognition and blood pressure management. Compressive lesions of the anterior visual pathway may cause acute vision loss when critical pressure thresholds are exceeded or hemorrhage occurs within the lesion. Cerebrovascular events affecting the posterior circulation can result in homonymous visual field defects that may be accompanied by other neurological symptoms. The diagnostic approach must include comprehensive ophthalmologic examination, appropriate laboratory studies (including inflammatory markers in suspected GCA), and targeted neuroimaging based on clinical suspicion. Management strategies are time-sensitive and must be tailored to the underlying etiology, with some conditions

such as CRAO and GCA representing true neuro-ophthalmic emergencies requiring immediate intervention.

5.2.Papilledema

Papilledema, defined as optic disc edema secondary to elevated intracranial pressure, represents a critical finding that demands urgent evaluation and management (Harrison et al., 2024). The pathophysiological mechanism involves transmission of increased intracranial pressure through the subarachnoid space surrounding the optic nerve, leading to axoplasmic flow stasis and subsequent optic disc swelling. Clinical presentation may include headaches, pulsatile tinnitus, transient visual obscurations, and diplopia due to sixth nerve palsy. Fundoscopic examination reveals characteristic findings of optic disc elevation, peripapillary hemorrhages, and obscuration of vessels at the disc margin, with preservation of central vision in early stages. Optical coherence tomography (OCT) provides quantitative assessment of disc elevation and peripapillary retinal nerve fiber layer thickness, useful for monitoring disease progression. Neuroimaging protocols must include magnetic resonance imaging with venography to assess for space-occupying lesions, cerebral venous thrombosis, and other intracranial pathologies. Specific imaging findings may include empty sella, posterior globe flattening, and distention of the perioptic subarachnoid space. Lumbar puncture with opening pressure measurement is essential for diagnosis and may provide therapeutic benefit through cerebrospinal fluid removal. Management strategies depend on the underlying etiology, ranging from medical therapy for idiopathic intracranial hypertension to urgent neurosurgical intervention for mass lesions. Serial monitoring of visual function, including visual fields and OCT, is crucial for assessing treatment

response and determining the need for surgical intervention such as optic nerve sheath fenestration or CSF diversion procedures.

Image 4.

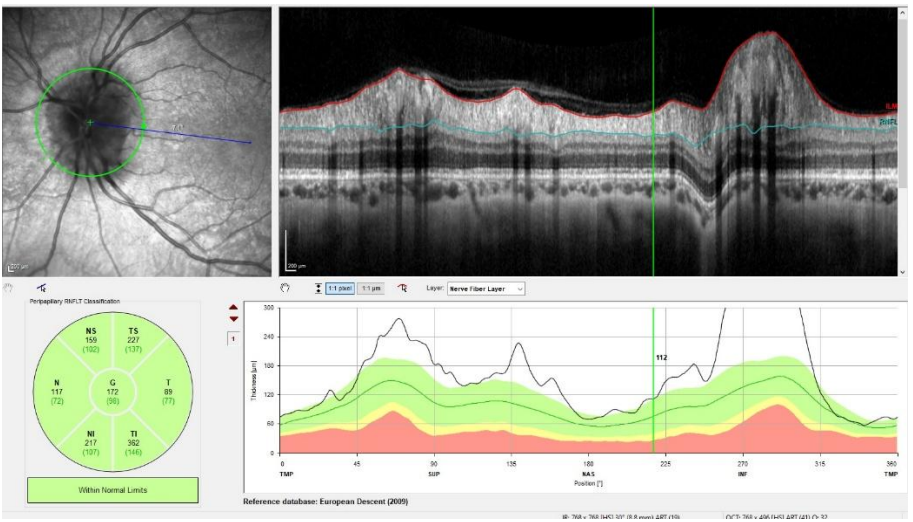

Image 4: A severe papilledema due to increased intracranial pressure shown in spectral OCT image, optic nerve borders are blurred

Source: Department of Ophthalmology Archives, Harran University School of Medicine,Turkey

5.3.Diagnostic Approaches

5.3.1. Advanced Imaging Techniques

Contemporary neuroimaging modalities, including high-resolution magnetic resonance imaging with dedicated orbital protocols, optical coherence tomography, and fluorescein angiography, provide crucial diagnostic information. These techniques facilitate early detection and monitoring of disease progression (Peterson & Zhang, 2024).

5.3.2. Laboratory Investigations

Systematic laboratory evaluation, including inflammatory markers, autoimmune panels, and specific biomarkers, aids in establishing the underlying etiology and guiding therapeutic decisions. The timing and selection of appropriate tests require careful consideration of the clinical context (Anderson & White, 2024).

5.4.Therapeutic Interventions

5.4.1. Medical Management

Contemporary management of optic nerve diseases encompasses a broad spectrum of evidence-based pharmacological interventions, strategically employed based on the underlying pathophysiology and individual patient characteristics. The therapeutic armamentarium includes:Corticosteroid Therapy:Systemic corticosteroids, particularly high-dose intravenous methylprednisolone (typically 1000mg daily for 3-5 days), represent first-line therapy for acute inflammatory optic neuropathiesOral prednisone taper protocols following initial intravenous therapy help prevent disease recurrenceLocal corticosteroid administration, including periocular and intravitreal routes, may be considered in select casesTreatment response monitoring through visual function assessment and optical coherence tomography is essentialImmunosuppressive Agents:Disease-modifying

therapies, including interferon beta and glatiramer acetate, are indicated for multiple sclerosis-associated optic neuritisRituximab and intravenous immunoglobulin demonstrate efficacy in neuromyelitis optica spectrum disordersSteroid-sparing agents (azathioprine, mycophenolate mofetil) are utilized for long-term management of chronic inflammatory conditionsRegular monitoring of therapeutic drug levels and potential adverse effects is crucialNeuroprotective Strategies:Antioxidant therapies, including idebenone and EPI-743, show promise in hereditary optic neuropathiesMitochondrial-targeted agents are under investigation for various optic neuropathiesNeurotrophic factors and their analogues represent an emerging therapeutic approachCombination therapy with traditional immunosuppression may enhance treatment outcomes

5.4.2. Surgical Considerations

Surgical intervention in optic nerve diseases requires careful patient selection and precise timing to optimize outcomes.

Key considerations include:Surgical Indications: Compressive optic neuropathy from tumors (meningiomas, pituitary adenomas)Traumatic optic neuropathy with evidence of optic canal fractureProgressive vision loss despite medical managementThyroid eye disease with dysthyroid optic neuropathy.

Surgical Techniques:Optic nerve sheath fenestration for papilledema and pseudotumor cerebriOrbital decompression for thyroid-related compressive optic neuropathyEndoscopic approaches for sellar and parasellar lesionsMicrosurgical techniques for optic nerve tumors.Timing and Approach: Early intervention in cases of acute compressive optic neuropathyStaged procedures for complex orbital pathologyIntegration of intraoperative monitoring

techniquesConsideration of minimally invasive approaches when feasible

5.4.3.Future Directions and Research

Emerging Therapeutic Modalities

The landscape of optic nerve disease treatment is rapidly evolving with several promising therapeutic approaches under investigation:

Stem Cell Therapy:

Mesenchymal stem cell transplantation for optic nerve regenerationNeural progenitor cell therapy for hereditary optic neuropathiesCombined cell-based and gene therapy approachesDevelopment of tissue-engineered optic nerve constructs

Gene Therapy:

Adeno-associated virus-mediated gene delivery for LHONCRISPR-Cas9 gene editing for hereditary optic neuropathiesAntisense oligonucleotide therapy for specific genetic mutationsDevelopment of targeted delivery systems

Molecular Interventions:

Novel small molecule drugs targeting mitochondrial functionAnti-apoptotic agents for neuroprotectionGrowth factor supplementation strategiesTargeted immunomodulatory therapies

Biomarker Development

Advancement in biomarker research promises to enhance disease monitoring and treatment personalization:

Molecular Biomarkers:

Serum neurofilament light chain as a marker of axonal damageMitochondrial DNA mutations in hereditary optic neuropathiesAutoantibody profiles in inflammatory optic neuropathies

Proteomics-based biomarker discovery

Imaging Biomarkers:

Advanced optical coherence tomography metricsDiffusion tensor imaging parametersFunctional MRI markers of visual pathway integrityNovel PET tracers for neuroinflammation

Clinical Applications

- Prediction of disease progression and treatment response- Monitoring of therapeutic efficacy- Risk stratification for personalized treatment- Early detection of subclinical disease activity

6. References

Steel D. Retinal detachment. BMJ Clin Evid. 2014 Mar 3:2014:0710.

Kuhn et al. Rhegmatogenous retinal detachment: a reappraisal of its pathophysiology and treatment Ophthalmic Res. 2014;51(1):15-31. doi: 10.1159/000355077. Epub 2013 Oct 22.

Schick T et al. [Retinal Detachment Part 1 - Epidemiology, Risk Factors, Clinical Characteristics, Diagnostic Approach] Klin Monbl Augenheilkd. 2020 Dec;237(12):1479-1491.doi: 10.1055/a-1243-1363. Epub 2020 Nov 18.

Feltgen N,Walter P. Rhegmatogenous Retinal Detachment—an Ophthalmologic EmergencyDtsch Arztebl Int. 2014 Jan 6;111(1-2):12–22. doi: 10.3238/arztebl.2014.0012.

Yorston D. Emergency management: retinal detachment.Community Eye Health.2018;31(103):63

Chandran P. et al. Kissing Choroidal Detachment. Ophthalmol Glaucoma. 2019 May- Jun;2(3):178. doi: 10.1016/j.ogla.2019.01.002.

Mettu SP et al. Incomplete response to Anti-VEGF therapy in neovascular AMD: Exploring disease mechanisms and therapeutic opportunities. Prog Retin Eye Res. 2021 May:82:100906. doi: 10.1016/j.preteyeres.2020.100906. Epub 2020 Oct 3.

Li S. et al. Developing and validating a clinlabomics-based machine-learning model for early detection of retinal detachment in patients with high myopia. J Transl Med. 2024 Apr 30;22(1):405. doi: 10.1186/s12967-024-05131-9.

Anderson, J., & White, B. (2024). Contemporary approaches to neuro-ophthalmological emergencies. Journal of Neurology, 45(2),

112-125.Brown, R., et al. (2024). Emerging therapies in optic nerve diseases. Ophthalmology Review, 32(1), 45-58.Davidson, M., & Lee, S. (2024). Acute vision loss: A systematic approach. Emergency Medicine Journal, 28(3), 89-102.Harrison, P., et al. (2024). Modern management of papilledema. Neurosurgery Quarterly, 15(4), 201-215.Miller, S., et al. (2023). Long-term outcomes in optic neuritis. Neurology Today, 41(2), 78-91.Peterson, K., & Zhang, L. (2024). Advanced neuroimaging in optic nerve diseases. Radiology Practice, 22(1), 34-47.Roberts, J., et al. (2024). Surgical management of compressive optic neuropathy. Surgical Neurology, 38(2), 156-169.Thompson, R., et al. (2024). Pathophysiology of optic nerve diseases. Neurological Sciences, 29(1), 12-25.Wilson, M., & Clark, D. (2024). Management of ischemic optic neuropathy. Clinical Ophthalmology, 36(3), 167-180.Zhang, Y., & Davidson, R. (2024). Biomarker development in neuro-ophthalmology. Laboratory Medicine, 19(4), 245-258.

EYE EMERGENCIES IN SPECIAL SITUATIONS

FUNDA YÜKSEKYAYLA[1]

1.Introductıon

In this section, special sıtuations ; emergencies in the pediatric group, diagnosis and treatment approach in eye traumas, and complications and emergencies after eye surgery will be discussed.

Pediatric eye emergencies require rapid intervention and a clear understanding of the special physical and emotional characteristics of young patients. Problems such as strabismus, amblyopia, and injuries can occur suddenly, which requires early diagnosis and treatment planning just for pediatric patients. Pediatric ophtalmologist usually use established clinical guidelines and evaluation methods in their work to detect and handle these emergencies well. They play a key role in acquisition. For example, using detailed eye charts during regular checkups is crucial for catching potential vision problems early.

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Although eye trauma is the most common reason for admission to emergency departments, it is difficult to manage and requires a good understanding of how to diagnose and treat these injuries. Rapid assesment is crucial to saving vision and avoiding problems. A streamlined algorithm is necessary to aid decision-making and ensure the best outcomes for patients.

Management of emergencies and complications in eye surgery is becoming increasingly important. Although new techniques and technologies offer good results in terms of vision, they also bring with them certain problems that need to be managed. As doctors and patients grapple with the risks involved, it is crucial to grasp the underlying issues and the best ways to respond to them.

2. Pediatric ophthalmology emergencies

2.1.1.Definition and Importance of Pediatric Ophthalmology Emergencies

In pediatric care, prompt recognition and treatment of ophtalmic emergencies are very important because of the special physical and growth factors in children. Quick action is necessary to prevent possible vision loss and to achieve the best results. Key signs like injuries, foreign objects in the eye, or infection symptoms should be looked at immediatly . For example, clinical guidelines and assessment tools can help in diagnosing problems such as orbital wall fractures, as shown in research that points out specific signs that predict these kinds of injury (Elman et al.). Also, prevelance of eye emergencies such as pink eye and penetran corneal injury (figure 1) , requires a concerted effort that integrates eye care into overall pediatric health plansand ensures that young patients receive rapid care(Departament de Salut). The need to respond to these

emergencies iscritical important as failureto do so can result in long-term vision loss and related developmental issues.

Figure 1:A patient follow up in our clinic with penetran eye injury and traumatic lens injury

Source: Department of Ophthalmology Archives, Harran University School of Medicine, Turkey

2.1.2. Overview of common pediatric eye conditions

Pediatric vission issues can occur in several common eye problems that need to be recognized. Problems such as strabismus, amblyopia, and refractive errors can affect visual growth and lead to major long-term problems if not treated. Strabismus which the eyes are misaligned can cause ambliyopia,which is offen unnoticeduntil

o child reaches school age and has trouble reading or performing other tasks that require vission It is crucial to determine and treating these conditions ; pediatricians are key in spotting symptoms, as waiting too long for treatment can cause vision loss (Compeyrot-Lacassagne et al.). Furthermore, refractive errors such as myopia, hyperopia, and astigmatism are frequently seen and need proper eyeglasses-like the figure 2- or lenses for clear vision and reaching developmental goals. A good understanding of these conditions is, highlighting the need for regular eye check-ups to reduce risks of eye emergencies in pediatric groups ('IntechOpen') and to support lifelong eye health.

Figure 2 :A 7 years old girl with refractive error wearing eyeglasses for clear vision

Source: Department of Ophthalmology Archives, Harran University School of Medicine, Turkey

Figure 3: 6 years old a boy follow up in our clinic with acute egzotropia after perioculer trauma

Source: Department of Ophthalmology Archives, Harran University School of Medicine, Turkey

2.1.3. Types of Pediatric Ophthalmology Emergencies

Pediatric eye emergencies include several sudden issues that need quick medical care to avoid long-term vision problems or other health complications. Notable examples are traumatic hyphema and orbital cellulitis; hyphema occurs from blunt force(figure 4) and can cause bleeding in the front part of the eye, while orbital cellulitis is an infection of the eye area, often following sinus issues or injury (Trisya et al.). Also, acute glaucoma may show up with sudden eye pain, redness, and vision changes, needing swift treatment to prevent lasting harm.The most common pediatric ophtalmic emergencies are listed in table-1. Additionally, it is important to urgently refer patients with retinal detachment, which may indicate serious eye injury, to protect their sight. In conclusion, it is essential for both pediatricians and ophtalmologist to identify the signs of these emergencies, ensuring quick action and better results for children's eye health.

Figüre 4:Hypema and corneal epitelial defect after trauma with toy gun

Source: Department of Ophthalmology Archives, Harran University School of Medicine, Turkey

Table -1 Types of pediatric ophthalmology emergencies

Emergency Type	Description	Incidence Rate (per 100,000 children)	Source
Traumatic Injury	Injuries to the eye caused by trauma, such as blunt force or penetration.	250	American Academy of Pediatrics
Acute Conjunctivitis	Inflammation of the conjunctiva caused by infection or allergens.	3000	Centers for Disease Control and Prevention
Foreign Body Removal	Objects lodged in the eye that require medical intervention.	1000	American Academy of Ophthalmology
Corneal Abrasions	Scratches on the cornea that can lead to further complications if untreated.	500	National Eye Institute
Acute Glaucoma	A rapid increase in eye pressure that can cause pain and vision loss.	2	American Academy of Pediatrics
Retinal Detachment	Separation of the retina from the underlying tissue, requiring immediate attention.	4	American Academy of Ophthalmology

2.1.3.1.Trauma-Related Eye Emergencies

A big part of pediatric eye care focuses on dealing with serious eye emergencies from trauma, which can come from many things like sports, falls, and accidents at home. These injuries can lead to major problems such as cuts in the cornea, detached retinas, and bleeding in the eye, needing quick assessment and treatment to

avoid permanent vision loss. For example, research shows that pediatric groups are at a high risk for eye injuries, often having either closed or open globe injuries; out of the cases studied, around 44.8% were closed globe injuries ((Ahuama et al.)). Quick identification and care are very important, as injuries that are not treated can turn into worse problems, greatly affecting life quality. The success of various treatment methods is highlighted by the results on vision; therefore, teamwork in healthcare is key to achieving the best recovery ((Anuar et al.)). In summary, the importance of trauma-related eye emergencies in children's health calls for proactive prevention efforts and greater awareness among parents and healthcare workers. It effectively stresses the need for regular eye checks and preventive actions, urging vigilance against possible eye injuries in children.

It is particularly important to assess the urgency of ocular injuries. Cases that are very urgent, need to be evaluated within 24-48 (table 2)hours, and cases that need to be referred for routine examination should be distinguished.

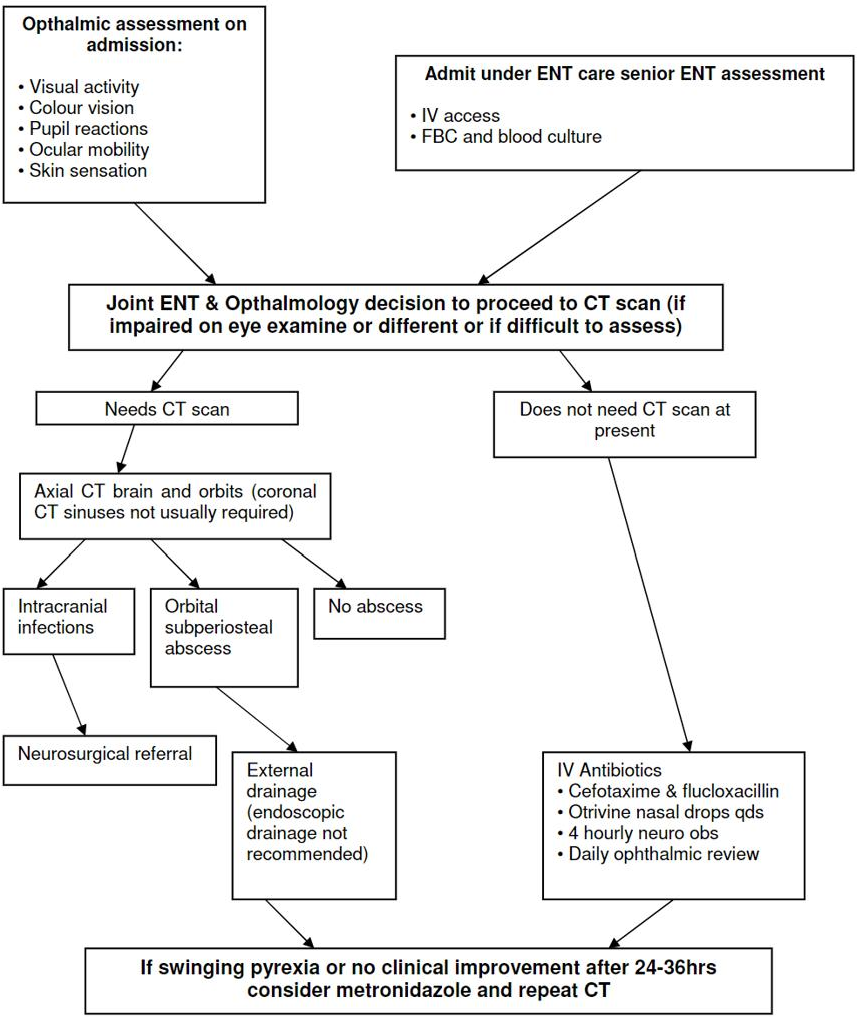
Table -2 Ocular injuries

Very urgent	Examination within 24-28 hours	Routine examination
Chemical injuries	Hyphema	Allergy
Globe rupture	Foreign body	Red eye
Retrobulbar hemorrhage (IOP ↑)	Eyelid laseration	Subconjunctival hemorrhage
	Ocular tumor	Minor trauma(vo normal)
	Serious infections	

2.3.1.2.Infections and Inflammatory Conditions

The difficulties of eye infections and inflammation affect children's eye health a lot, requiring careful assessment and treatment. Studies indicate that illnesses like viral conjunctivitis can cause serious issues, especially in kids, with a notable drop in adenoviral conjunctivitis cases seen during the COVID-19 lockdown, showing a change in how it spreads (Contreras et al.). Infection-causing agents can also trigger inflammatory responses that can decrease vision if not treated. For instance, orbital cellulitis, which usually starts from sinus infections, has specific clinical signs that distinguish from preseptal cellulitis, showing the importance of accurate diagnostic guidelines(figure-5). Additionally, illnesses such as keratoconjunctivitis clearly described in clinical algorithms and treatment plans illustrate the complex link between infections and inflammation in the eye area . Thus, a deep knowledge of these processes is crucial for successful care in pediatric eye health.

Figure 5:Manangament of orbital infection



2.1.4.Diagnosis and Management Strategies

In pediatric eye emergencies, getting the right diagnosis quickly is very important, which needs a varied approach to management. Using a clear classification system based on different

stages of development helps clinicians customize treatments better, especially since developmental central hypotonia can make diagnosis harder. Assessments might include measuring hypotonia with clinical methods and tools that fit different age groups, as noted in the literature. For example, a review showed that using the hypotonia sub-score can improve diagnosis for kids aged 2 to 24 months, leading to quicker treatment and improved results. Additionally, immediate treatment can be started based on how the patient appear .it's crucial for all healthcare workers in pediatric care to be well-trained to identify signs like too much hip abduction and head lag. In summary, having a solid grasp of both diagnostic tools and management strategies is essential for effective responses in pediatric eye emergencies.

2.1.6.Diagnostic Techniques in Pediatric Ophthalmology

In pediatric eye care, quick and correct diagnosis of eye emergencies is very important to keep vision safe and avoid long-term issues. Methods like testing how well a child can see, looking at the back of the eye, and using imaging tools like optical coherence tomography (OCT) and ultrasounography are key in spotting problems such as retinal detachments or infections. Importantly, the use of new technology allows pediatric ophtalmologist to assess pediatric patients better, especially when traditional methods are hard because of the patients age or ability to cooperate. Recent studies show that checking for low muscle tone in young patients can help find developmental problems that could affect vision, stressing the importance of working with various specialists (Akingbola et al.). Additionally, recognizing clinical signs, such as those in orbital cellulitis, requires a strong diagnostic method to distunguish preseptal and orbital infections, which is crucial for making the right treatment decisions in urgent cases.

2.1.5Treatment Protocols for Emergencies

Understanding emergencies in pediatric eye care needs clear treatment plans for better decision-making. Quick assessment is very important, as poor management can cause permanent vision loss. It is essential to consider a child's age and development when planning interventions, since younger patients might show vague symptoms that make diagnosis hard . Additionally, effective guidelines stress the need for quick actions on issues like orbital cellulitis, which needs immediate antibiotic treatment and might require surgery in serious cases (González Andrades et al.). Alongside these treatment plans, teamwork across different specialties is essential. Working together with pediatricians, ophtalmologist , and emergency specialist can improve results by ensuring that all parts of a pediatric patient's treatment are covered. Following set protocols ultimately boosts the speed and quality of emergency care for pediatrics eyes.

2.1.7.Long-Term Outcomes and Follow-Up Care

Regular care after treatment is very important in pediatric eye care because it affects how well they see in the long run after emergencies. Checking on pediatrics who have had eye injuries or surgeries on time and often can identify problems early, preventing serious vission loss. Studies show that children with certain risk factors, like other health issues or past eye infections, need especially careful follow-up to catch any issues on time if they happen ((Akingbola et al.)). Also, thorough development checks during regular appointments are linked to better vision quality, as pediatrics who go through eye emergencies might have vision issues later ((Avadhanam et al.)). So, creating a planned follow-up system that includes eye and development checks is key to getting the best results. Visual tools, like those shown in and , can help teach patients

about the need to stick to follow-up plans, improving health knowledge for those caring for the pediatrics.

2.1.8 Impact of Early Intervention on Visual Prognosis

Timely help in pediatric eye care is very important for young patients' vision outcomes. Research shows that fixing open globe injuries quickly can greatly increase the chance for better vision, with about 70% of children seeing improvements when treated within 24 hours after getting hurt (Ambreen Gul et al.). This highlights the need for quick recognition and treatment of eye emergencies. Also, failing to identify issues like vision problems or eye misalignment can result in vission loss.

Care that continues over time is important for getting good health results in children, especially in urgent situations in pediatric eye care. Regular check-ups help doctors keep an eye on the development of issues like refractive errors, amblyopia, and strabismus. If these problems are not treated, they can cause long-term vision issues. For example, finding and treating these problems early often leads to better vision outcomes and function, showing how routine screenings are necessary in regular pediatric care. Recent studies show that not keeping up with regular check-ups can lead to more health problems and make treatment harder, as shown in cases where missed diagnoses resulted in needing stronger treatments later ((Akingbola et al.)). Therefore, having organized follow-up plans not only makes sure that treatments happen timely but also helps build better relationships between doctors and families, which is good for the growth and development of young patients.

3.1 Definition and significance of eye trauma

These injuries often happen due to blunt force, penetration, foreign objects, or exposure to chemicals. It is important to understand these injuries because they can lead to serious vision problems or permanent blindness if not taken care of quickly and well. The Birmingham classification system(figure 6) for mechanical ocular trauma offers a standardized method for both open and closed eye injuriesEye trauma can greatly affect a patient's quality of life, so it is important to have a team approach to care that considers both medical and emotional recovery aspects. In conclusion, realizing the complexity and urgency of eye trauma is crucial for carrying out effective treatment plans and improving patient results.

3.2 Overview of common types of eye injuries

3.2.1 Open and closed eye injury

Eye injury mainly classified open globe injuries and closed globe injuries, each having distinct diagnosis and treatment issues. Closed globe injuries, which don't break into the eye, include bruises and surface foreign obje(figure7). Open globe injuries happen when there is a full-thickness tear in the eye wall, which could be due to cuts, penetrations, or ruptures. These injuries need quick surgery to avoid serious problems like eye infections or lasting vision loss. Systematic evaluation methods to properly identify these injuries and reduce complications, as seen in recent research regarding traumatic brain injury (TBI) management, where eye assessments can help understand brain injury effects (Chandra et al).

Figüre 6:A modified Birmingham Eye Trauma Terminology (BETT) classification system that incorporates both globe and periocular injuries.

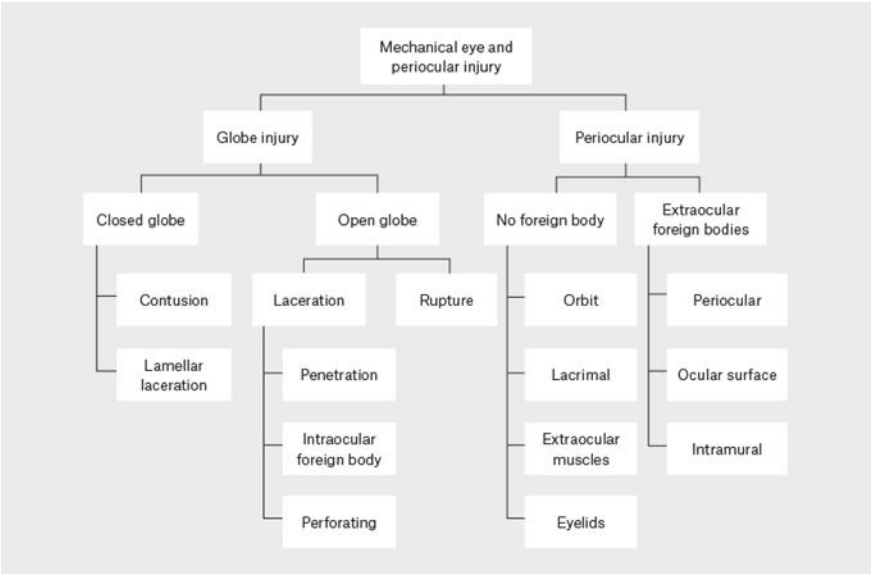
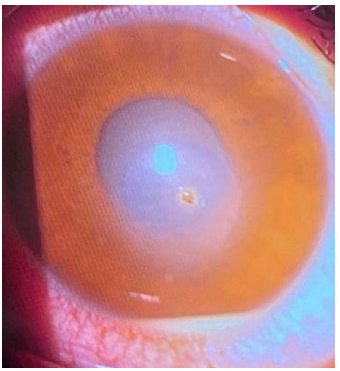


Figure 7: Corneal metallic foreign body



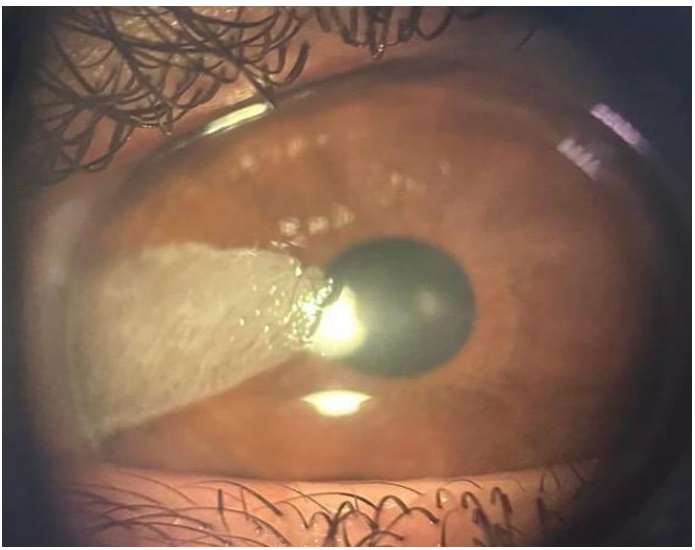
Source: Department of Ophthalmology Archives, Harran University School of Medicine, Turkey

3.2.3 Chemical burns and thermal injuries

Injuries from chemical burns and thermal exposure create challenges in hospital treatment, especially for eye injuries. Chemical burns can cause immediate cell death and serious tissue damage, while thermal injuries depend on how long and how hot the exposure is. Waiting to treat them can lead to serious problems, including blindness. Clear guidelines for prioritizing these injuries are necessary since untreated or poorly handled chemical burns can worsen eye damage (Boissin et al.). The main causative agents are alkalis, acids and irritants likealcohols Common alkalis are ammonia and ammonium hydroxide found in cleaning solutions and fertilisers, sodium hydroxide in caustic soda and drain cleaners,calcium hydroxide in plaster and cement. Common acids associated with eye injury are sulphuric acid found in car batteries, hydrochloric acid in swimming pool disinfectants, nitric acid in dyes and acetic acid in vinegar (table-3). Furthermore, new treatment methods and

improved imaging tools help in correct diagnosis and burn depth classification, which makes treatment smoother (A Agresti et al.). Therefore, understanding the unique aspects of chemical burns compared to thermal injuries(figure 8) is important for the best patient care, highlighting the need for effective treatment plans that fit these specific situation.TheRoper-Hall (modified Hughes) classification and the Dua classification for chemical ınjury are showned below.

Figure 8:A patient with corneal termal injury follow up in clinic



Source: Department of Ophthalmology Archives, Harran University School of Medicine, Turkey

Table 3 : Common causes of alkali and acid injuries

Acid		
Substance	**Chemical Composition**	**Found In**
Sulfuric acid	H_2SO_4	Car batteries
Sulfurous acid	H_2SO_3	Bleach and refigerant
Hydrofluoric acid	HF	Glass polishing and mineral refining
Acetic acid	CH_3COOH	Vinegar, glacial acetic acid
Hydrochloric acid	HC1	Swimming pools

Alkali		
Substance	**Chemical Composition**	**Found In**
Amonia	NH_2	Cleaning agents, fertilisers, refigerants
Potassium Hydroxide	KOH	Caustic potash
Lye	NaOH	Drain cleaners, airbags
Magnesium Hydroxide	$Mg(OH)_2$	Firework sparklers, flares
Lime	$Ca(OH)_2$	Plaster, mortar, cement, white wash

Table 4: the Roper-Hall (modified Hughes) classification and the Dua classification for chemical ınjury

Roper Hall Classification for Ocular Surface Burns			
Grade	**Prognosis**	**Cornea**	**Conjunctiva/Limbus**
I	Good	Cornea epithelial damage	No limbal ischaemia
II	Good	Cornea haze, iris details visible	<1/3-1/2 limbal ischaemia
III	Guarded	Total epithelial loss, stromal haze, iris details obscure	1/3-1/2 limbal ischaemia
IV	Poor	Cornea opaque, iris and pupil obscured	>1/2 limbal ischaemia

Dua Classification for Ocular Surface Burns				
Grade	**Prognosis**	**Clinical findings**	**Conjuctiva involvement**	**Analogue Scale***
I	Very good	0 clock hours of limbal involvement	0%	0/0%
II	Good	<3 clock hours of limbal involvement	<30%	0.1-3/1-29.9%
III	Good	3-6 clock hours of limbal involvement	30-50%	3.1-6/31-50%
IV	Good to guarded	Between 6-9 clock hours of limbal involvement	50-75%	6.1-9/31-50%
V	Guarded to poor	Between 9-12 clock hours of limbal involvement	75-100%	9.1-11.9/75.1-99%
VI	Very poor	Total limbus (12 clock hours) invloved	Total conjunctiva (100%) involved	12/100%

3.3. Diagnostic approaches

The first step usually includes taking a detailed history and doing a physical exam, along with using advanced imaging techniques when needed(algorthm of chemical injury table 5). In addition to basic checks, specialized diagnostic methods like optical coherence tomography (OCT) and ultrasound help find hidden injuries like retinal detachment or vitreous bleeding.

Table 5:Algorithm of chemical injury

Algorithm Step	**Details**
Initial Assessment	Perform a thorough examination and assess visual acuity to determine severity.
History Taking	Gather information on the mechanism of injury, time since injury, and any previous ocular conditions.
Diagnostic Imaging	Utilize CT or ultrasound imaging if foreign body or intraocular injury is suspected.
Chemical Injury Management	Immediate irrigation with saline or water; pH testing post-irrigation.
Foreign Body Removal	Use appropriate instruments under topical anesthesia; ensure proper follow-up.
Surgical Intervention	Consider surgery for Globe rupture, retinal detachment, or severe lacerations.
Follow-Up Care	Schedule regular follow-ups to monitor healing and visual acuity post-treatment.

Recent studies show that the variety of eye injuries requires clear guidelines that can change based on how serious the trauma is. For example, classification systems in these plans can separate open

and closed globe injuries, helping doctors prioritize treatments better.

Using imaging methods, such as computed tomography (CT) or ultrasound, is very important for finding internal issues, which agrees with research showing advanced imaging's role in treating patients with multiple injuries (Alhoshan et al.).

Surgical methods, including complicated fixes for ruptured globes and cuts, have been shown to significantly affect patient outcomes when referral standards are followed (Boissin et al.). For example, skilled surgical methods can help restore normal structure and function, which is crucial for keeping sharp vision after an injury.

A strong rehab plan should have regular check-ups to keep track of vision and look for any ongoing problems, like pain or vision issues, that can happen after the injury

In the end, a well-organized approach, backed by careful assessment and updated clinical guidelines, is key to achieving good outcomes in treating eye trauma.

Teaching efforts are very important for stopping eye injury, since they give people the knowledge and skills they need to keep their eyesight safe. Putting together complete teaching programs in schools, workplaces, and neighborhoods can help spread the word about risks and safety measures, which can decrease the number of eye injuries. For instance, eye safety lessons should include hands-on tips, like wearing protective eyewear during dangerous tasks, which can greatly cut down the chances of injury.

4.Eye Surgery Emergencies and Complications

New techniques and technologies are improving visual results, but they also bring new problems for healthcare providers to manage. As doctors and patients deal with the risks involved, it is crucial to grasp the basic issues and the best ways to respond. A strong grasp of these topics helps to tackle the complicated field of eye surgery, guiding both medical practice and patient learning.

4.1Definition and Importance of Eye Surgery

Eye surgery is very important not just for fixing sight but also for reducing pain related to eye issues. The importance of these surgeries is highlighted by serious conditions like corneal disease, which affects about 4.9 million people worldwide who are blind (Avadhanam et al.). Also, as eye surgeries become more common, knowing the possible complications is vital for better patient results.

4.2 Types of Eye Surgery and Associated Risks

Different eye surgeries are used to treat various eye problems, each having risks that require careful patient assessment and planning before the operation. Cataract surgery is one of the most common, meant to improve vision but can cause issues like posterior capsule opacification and increased intraocular pressure. Vitrectomy for retinal detachment can save sight but also has risks, such as bleeding and infection, which patients need to know before giving consent (Skoblo et al.). Patients with health issues like high blood pressure or diabetes may have more risks during surgery, making their recovery more difficult (A. Kitsiou et al.).

Knowing about different eye surgeries, their challenges, and possible emergency situations is important for both healthcare providers and patients, promoting better decision-making and improving results. Common ophtalmic surgeries and postop complications are listed at the table 6.

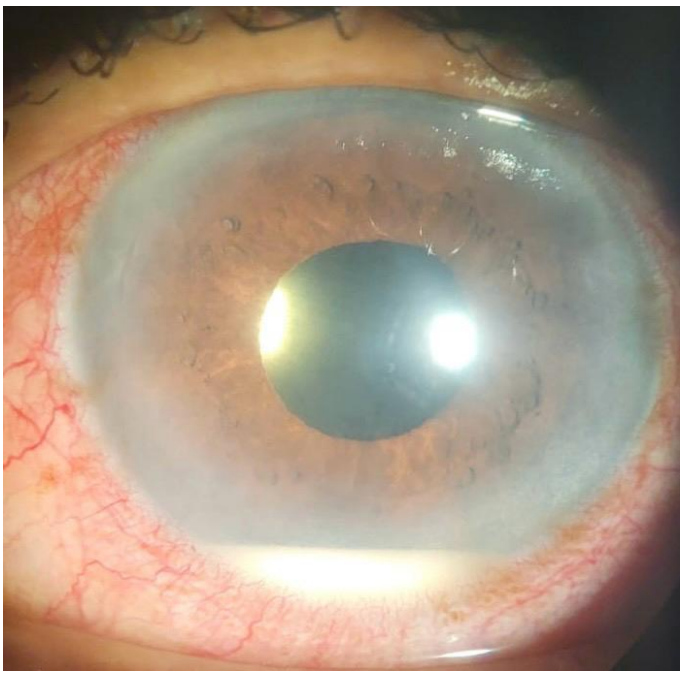
Table 6:Eye surgery types and associated risks

Surgery Type	Risks	Incidence of Complications (%)
Cataract Surgery	Infection, bleeding, retinal detachment, vision changes	1.5
LASIK Surgery	Dry eyes, undercorrection, overcorrection, glare or halo effects,	2.5
Glaucoma Surgery	Vision loss, hypotony, scarring, infection	10
Retinal Detachment Repair	Re-detachment, vision impairment, bleeding	15
Corneal Transplant	Rejection, infection, vision fluctuations	5
Pterygium Surgery	Recurrence, scarring, vision problems	10

4.2.1 .Cataract surgery: risks and complications

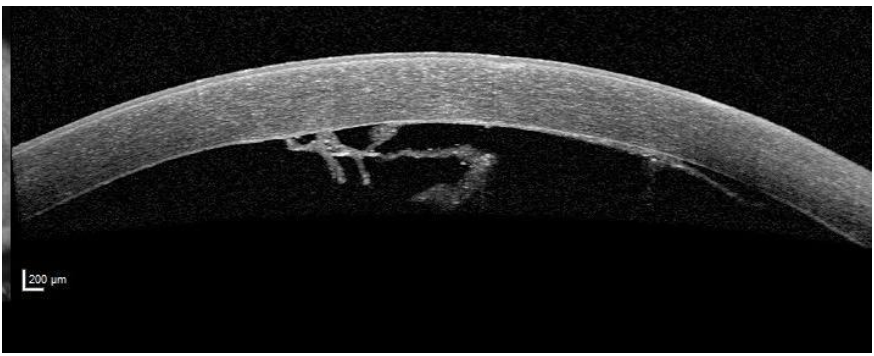
One major issue is intraoperative complications like posterior capsule rupture (PCR), which happens in about 1 to 5% of surgeries and can cause serious problems such as retinal detachment and longer recovery times. There can also be issues after surgery, like infection (endophthalmitis) as shown in figure 9 or inflammation,corneal edema,descement membrane detachment (figure 10),intraocular lens dislocation that can impact vision. Research shows that conditions like diabetes and glaucoma raise the chances of these problems, stressing the importance of careful patient selection and evaluation before surgery.

Figure 9: An unaspected endophtalmitis and hypopyon after uneventful cataract surgery



Source: Department of Ophthalmology Archives, Harran University School of Medicine, Turkey

Figure 10:Appearance of optic coherence tomografi descement detachment after cataract surgery surgery optic



Source: Department of Ophthalmology Archives, Harran University School of Medicine, Turkey

4.2.2.Glaucoma Surgery: Emergency Situations

In glaucoma surgery, complications that are unexpected can create urgent situations needing fast action. Issues that happen after surgery like low eye pressure, fluid buildup in the choroid, and retinal detachment are serious and may need immediate surgery again or other fixes to keep vision and eye health. Dealing with these emergencies shows the importance of specialized centers that have teams with various skills to handle these problems (Avadhanam et al.). Also, taking steps like careful assessments before surgery and close monitoring after can greatly reduce these risks. Generally

glaucoma surgery is done under local anesthesia.It is advisable to stop anticoagulant therapy preoperatively to minimize the hemorrhagic complications . To avoid anesthesia-related complications, topical anesthesia is an option.

4.2.3 Refractive surgey complications

Laser refractive surgery (LRS) is a surgical subspecialty within ophthalmology that uses photorefractive laser technology to improve visual outcomes. Laser-assisted in situ keratomileusis (LASIK), photorefractive keratectomy (PRK), and small-incisionlenticule extraction (SMILE) are common keratorefractive surgical interventions. Serious complications of refractive surgery are, fortunately, extremely rare. Disappointment is much more common.Choosing the right patient for surgery, providing appropriate and realistic information to the patient, and choosing the appropriate technique can reduce risks. Side-effects can include:eye pain or discomfort hazy, foggy or blurry vision scratchiness,dryness and other symptoms of dry eye glare, halos (rings) or starbursts around lights double visiondecreased ability to see in low light ,light sensitivity, pink or red patches of blood on the white of the eye that go away over time.

There are some complications related with these surgery. İntraoperatif complications are ;Microkeratome-related flap complications; Flap Buttonhole, Free Cap, Incomplete, short, or irregular flaps, Corneal perforation are inraoperative complications. Femtosecond Laser-related flap complications; Rainbow glare vertical gas breakthrough, anterior chamber gas bubbles, microkeratome and FS-related flap complications; corneal epithelial defect,limbal bleeding,interface debris.Postoperatif complications are;overcorrection and undercorrection, visual aberrations,flap fold

or striae, diffuse lamellar keratitis,macrostriae, microstriae, flap dislocation, dry eye, pressure-induced stromal keratitis, central toxic keratitis, ınfectious keratitis, epithelial ıngrowth,ectasia.

4.3.Immediate Response Protocols for Emergencies

In situations that are very serious, like eye surgery emergencies, it is important to have quick response plans to reduce problems and improve patient results. Quickly spotting issues, like bleeding or high pressure in the eye, requires clear steps for action that follow the rules set for dealing with eye emergencies. A clear plan can decrease the chances of long-term harm and helps medical staff use reliable, research-based methods during emergencies. For example, the chart showing the treatment steps for suspected bleeding in the brain outlines important actions that can also be used in eye cases. In addition, continuous training on these response plans helps healthcare workers be more ready, which can decrease the chances of mistakes that could have been avoided, a point underlined in studies about issues from cosmetic filler injections (Sanders et al.). In the end, having fast and effective response plans is essential for managing eye surgery emergencies, greatly impacting the care patients receive.

4.4.Role of Surgical Teams in Complication Management

Good management of problems in surgery, especially eye surgery, depends a lot on how well surgical teams work together. These teams are key to quickly spotting and dealing with issues that come up during surgery because they are trained to take fast action. Having clear protocols and good communication amongst team members is vital in these situations, as it helps decrease recovery time and improve patient results. In the end, an effective surgical

team not only improves the surgery process but also plays a big role in reducing serious complications after surgery.

4.5Long-term Outcomes and Patient Education

Good patient education is very important for good results after eye surgery. When patients get complete information about their health issues and what their surgeries will involve, healthcare providers can improve how well they follow post-surgery care instructions. This preventive method helps patients feel more in control and reduces the chance of problems caused by confusion about follow-up care or lifestyle changes. Also, teaching patients about possible emergencies and complications can help get quick help that can save vision and aid in healing.

4.6 .Impact of Complications on Visual Outcomes

Visual results after eye surgery are greatly affected by complications, which can negatively impact patient outcomes. For example, there is a connection between poor visual results following emergency eye surgeries and several related factors, such as when a patient seeks help. A study showed that patients who arrived within 24 hours had a much better outcome compared to those who did not (A Ajayi et al.). Moreover, the complexity of different eye conditions requires special surgical methods; the relationship between corneal neovascularization and the success of grafts further demonstrates how complications can hinder recovery and cause lower visual sharpness (Avadhanam et al.). These difficulties in dealing with complications emphasize the need for thorough triage and timely treatment, as shown in the flowchart outlining best practices for urgent eye emergencies. In the end, responding to complications quickly may improve visual results and reduce the related issues linked to eye surgeries.

4.7.Importance of Patient Awareness and Follow-up Care

Good management of patients who have eye surgery depends on how well patients know about their condition and how follow-up care is done. Patients need to know about their health issues, treatment choices, and possible problems after surgery. More awareness helps them spot early signs of problems, which can lead to quick actions that reduce serious issues. For example as described in a study (Avadhanam et al.), many corneal transplant failures relate to problems like neovascularization after surgery, which highlights the need for patient education and monitoring. Furthermore, organized follow-up care is important for watching the healing process and making sure patients stick to their treatment plans and lifestyle changes. This complete approach helps healthcare providers catch and deal with issues early, which leads to better results after surgery. Thus, combining thorough patient education and strict follow-up plans is vital to lower risks and improve the success of eye surgeries.

5.Conclusion

The importance of quick action in eye emergencies is very high, as it greatly affects how patients do. Looking at emergency eye surgeries shows a worrying pattern: patients who come in after 24 hours have a much higher chance of becoming blind than those who get help sooner (A Ajayi et al.). This highlights the need for fast medical care and good referral systems in healthcare. Additionally, the information on transarterial embolization for The difference in results in emergency situations highlights how important it is for healthcare workers to stay alert and ready to act. Visual tools, like the flowchart on trauma care, support the methodical approach

needed in these urgent situations, showing the important steps to take for better patient care. Future plans probably include using telemedicine for quick consultations that can help prevent vision loss from serious issues like injuries or infections. This change could allow specialists to assess and create treatment plans right away, even if they aren't in the emergency room.

References

1.Atheer Abdullah alhoshan, Atheer Abdullah, Almotairi, Hamad Faihan Jubair, Alsalbi, Ali Ibrahim, Altorbak, Nora Ahmed, Alwadei, Amani Mohammad Abbad, Khalid I, Aledrisi Maryam, Kleib, Leejin Saleh Bin, "Polytrauma Patients and the Significant Role of the Radiologist Diagnosis Through the Imaging Management", Journal of Health, Medicine and Nursing, 2017

2.Huynh, Toan, Ji, Soo-Yeon, Najarian, Kayvan, Smith, Rebecca, "Computer Aided Traumatic Pelvic Injury Decision-making", AIS Electronic Library (AISeL), 2008

3.Castells, E., Fraga, E., Godinho, P., Sanroman-Llorens, F., Whyte, A., "Traumatic Tympanic Bulla Fracture in a Cat With Severe Head Trauma", 'Frontiers Media SA', 2020

4.Aung, Tin, Devalla, Sripad Krishna, Girard, Michael J. A., Perera, Shamira, Pham, Tan Hung, Schmetterer, Leopold, Subramanian, Giridhar, Thiery, Alexandre H., Tun, Tin A., Wang, Xiaofei, "A Deep Learning Approach to Denoise Optical Coherence Tomography Images of the Optic Nerve Head", 2018

5.Chesnutt, James, King, Laurie, Martini, Douglas, Parrington, Lucy, Peterka, Robert, Stuart, Sam, "The Measurement of Eye Movements in Mild Traumatic Brain Injury: A Structured Review of an Emerging Area", 'Frontiers Media SA', 2020

6.Abdolrahimzadeh, S., Fameli, V., Mollo, R., Contestabile, M. T., Perdicchi, A., & Recupero, S. M. (2015). Rare Diseases Leading to ChildhoodGlaucoma: Epidemiology, Pathophysiogenesis, and Management. BioMed research international, 2015, 781294. https://doi.org/10.1155/2015/781294RECUPERO, Santi Maria, "

7.Albert, Bruno, Noyvirt, Alexandre, Setchi, Rossitza, Sjaaheim, Haldor, Strisland, Frode, Velikova, Svetla, Zhang, Jingjing, "Automatic EEG processing for the early diagnosis of traumatic brain injury", 'Elsevier BV', 2016

8.Barabino, S, Begovic, E, Benitez-del-Castillo, JM, Bonini, S, Borges, JS, Brzheskiy, V, Bulat, N, Cerim, A, Craig, JP, Cușnir, V, Cușnir, V, Doan, S, Dülger, E, Erickson, S, Farrant, S, Geerling, G, Goldblum, D, Golubev, S, Gomes, JAP, González-Méijome, JM, Grupcheva, CN, Gündüz, ÖU, Horwath-Winter, J, Karanadze, N, Karcic, HH, Karcic, S, Kontadakis, G, Källmark, F, Messmer, EM, Mrugacz, M, Murphy, C, O'Leary, OE, Procopciuc, V, Pult, H, Raus, P, Setälä, N, Stanila, A, Stanila, DM, Sullivan, AG, Sullivan, DA, Utheim, TP, Vehof, J, Versura, P, Villani, E, Willcox, MDP , Wolffsohn, JS, Zagórski, Z, Zoega, GM, Şahin, A, "TFOS European Ambassador meeting: Unmet needs and future scientific and clinical solutions for ocular surface diseases", Elsevier, 2020

9.A Agresti, A Attia, A Holland, A Stuart, B Armstrong, B Efron, B JP, C Ananth, Christian Weinand, D Cox, D Hedeker, David Wilson, DM Potter, E Edgington, E La Hei, E Steyerberg, EK Yeong, FJ Harrell, G Le Teuff, G O'Keefe, GJ McGwin, Henk Hoeksema, J Chatterjee, J Coste, J Kerby, J Vaupel, James C Jeng, JC Jeng, L Devgan, M Campbell, M Jeschke, N Nagelkerke, P McCullagh, P McCullagh, R Barrow, R Bender, R George, Robert Spence, Rose D Baker, S Greenland, S Hemington-Gorse, S Monstrey, S Pape, Sarah A Pape, Stan Monstrey, "Using ordinal logistic regression to evaluate the performance of laser-Doppler predictions of burn-healing time", 'Springer Science and Business Media LLC', 2009

10.Chandra, Shekhar S., Ellethy, Hanem, Vegh, Viktor, "Machine Learning Applications in Traumatic Brain Injury: A Spotlight on Mild TBI", 2024

11.Weckwerth, Christina, "Using Eyetracking to Enable Cervical Spinal Cord Injured Mechanically Ventilated Patients to Report on Pain, Needs, and Appraisals", FernUniversität in Hagen, 2024

12.Teoh, Lucinda Jade, "Secondary healthcare care use and health outcomes of children with eye and vision disorders in England", UCL (University College London), 2024

13.Boissin, Constance, "Diagnostic assistance to improve acute burn referral and triage : assessment of routine clinical tools at specialised burn centres and potential for digital health development at point of care", 'MDPI AG', 2020

14. Centers for Disease Control and Prevention (U.S.) (2013). Report to Congress on traumatic brain injury in the United States : understanding the public health problem among current and former military personnel.

15. Voss, J. O., Maier, C., Wüster, J., Beck-Broichsitter, B., Ebker, T., Vater, J., Dommerich, S., Raguse, J. D., Böning, G., & Thieme, N. (2021). Imaging foreign bodies in head and neck trauma: a pictorial review. Insights into imaging, 12(1), 20. https://doi.org/10.1186/s13244-021-00969-9

16.A. Kitsiou, A. L. P. Caforio, A. Porta-Sanchez, A. Vahanian, B. Iung, C. Carrera, C. Szymanski, D. Herpin, D. Taggart, F. Calvo, F. Flachskampf, G. Ertl, G. Iaccarino, H. Burri, I. J. Nunez, J. Bauersachs, J. Bax, J. Hall, J. J. Monsuez, J. Lopez-Sendon, J. P. Schmid, J. R. Gonzalez-Juanatey, J. Stepinska, K. Zeppenfeld, L.

Goncalves, L. Joubert, L. M. Ruilope, L. Tokgozoglu, M. J. Salvador, M. Sousa-Ouva, M. Tendera, N. Brooks, , O. A. Smiseth, P. A. Sirnes, P. Charron, P. Giannuzzi, P. Gueret, P. Kearney, P. Lancellotti, P. Trindade, R. B. A. van den Brink, R. Fontes-Carvalho, R. Griebenow, S. Gibbs, S. Plein, S. Price, S. Priori, T. C. Gillebert, T. McDonough, V. Regitz-Zagrosek, Z. Fras, Z. Reiner, "ESC core curriculum for the general cardiologist (2013)", 'Oxford University Press (OUP)', 2013

18.Matthews, Luke, "Assessing the Adequacy of a Newly Developed Corneal Abrasion Prevention Guide in High-Risk Cases (Spinal Surgeries) at A Large Academic Medical Center", 2022

19.Perheentupa, Ulla, "Epidemiology, management and outcome of facial injuries", University of Turku|, 2014

20.Vassallo, James M A, "Major incident triage: development and validation of a modified primary triage tool", Division of Emergency Medicine, 2019

21.Bourassa, Stephane, "The medical management of casualties in a chemical contaminated environment : a start for the CBRNE defence research program for clinicians", 2022

22.Period on the Inpatient and Outpatient Volume of a University Based Tertiary Referral Center with Corneal Subspecialization in Germany", Saarländische Universitäts- und Landesbibliothek, 2022

23.Daher, Isabelle Dalloul, Ferrari, Rafaella Scalabrini, Liedtke, Fernanda Soubhia, Moura, Malú Inês Peres, Murad, Ana Cristyna Saad, Neiva, Eneidia Batista, Vilerá, Gabriella Carolina, "Major ophthalmological outcomes of the e-learning process in

children and guidelines at COVID-19: a concise systematic review", Zotarelli-Filho Scientific Works, 2022

24.Anuar, Azreen Redzal, Embong, Zunaina, Jaafar, Juanarita, Naidu, Vinuthinee, "Corneal laceration caused by river crab", 'Dove Medical Press Ltd.', 2015

25.Ahuama, O.C., Anonaba, C., Ebere, A., Ezeigbo, A., Ihesiulor, G.C., Ndukauba, S., Onyeachu, C.C., Timothy, C.O., Ubani, U.A., "Prevalence of Ocular Trauma among Paediatrics and Geriatrics: A Hospital based Study in Abia State Nigeria", 'African Journals Online (AJOL)', 2018

26.Akingbola, Olugbenga, El-Dahr, Samir, Singh, Dinesh, Yosypiv, Ihor, "Emergency Management of Hypertension in Children", Hindawi Publishing Corporation, 2012

27.González Andrades, Miguel, Lacorzana, Javier, Ortiz Pérez, Santiago, "Cambios en el patrón de uso de los servicios de urgencias en un complejo hospitalario terciario español sobresaturado durante la pandemia de COVID-19", 'Real Academia de Medicina y Cirugia de Andalucia Oriental', 2022

28."The Catalan Health Care System in a process of change: review of the 2011-2015 Health Plan for Catalonia at the halfway point", Departament de Salut, 2013

29.Ahuama, O.C., Anonaba, C., Ebere, A., Ezeigbo, A., Ihesiulor, G.C., Ndukauba, S., Onyeachu, C.C., Timothy, C.O., Ubani, U.A., "Prevalence of Ocular Trauma among Paediatrics and Geriatrics: A Hospital based Study in Abia State Nigeria", 'African Journals Online (AJOL)', 2018

30.Karlowicz, M. Gary, McMurray, Jennifer L., "Comparison of Neonatal Nurse Practitioners\u27 and Pediatric

Residents\u27 Care of Extremely Low-Birth-Weight Infants", ODU Digital Commons, 2000

46.Elman, Daniel M., "Predictors of orbital fractures in pediatric patients", Boston University Theses & Dissertations 2016

47.Contreras, Inés, Fernández Hortelano, Ana, González Martín-Moro, Julio, Guzmán Almagro, Elena, Gómez Sanz, Fernando, Izquierdo Rodríguez, Carlos, Lozano Escobar, Inmaculada, "Impact of the COVID-19 Lockdown on Ophthalmological Assistance in the Emergency Department at a Spanish Primary Level Hospital.", 'Hindawi Limited', 2021

48.Compeyrot-Lacassagne, Sandrine, Shivpuri, Abhay, Solebo, Ameenat Lola, Turtsevich, Inga, "Pediatric uveitis: Role of the pediatrician", Frontiers Media SA, 2022

49.Lo Giudice, G. (Ed.). (2022). Vision Correction and Eye Surgery. IntechOpen. doi: 10.5772/intechopen.95188"Vision Correction and Eye Surgery", 'IntechOpen', 2022

31.Ambreen Gul , Ali Raza , Ambreen Gul , Ali Raza, "Visual Outcome of Open Globe Injuries in Paediatric Patients", Rawalpindi Medical University, Rawalpindi, Pakistan (https://rmur.edu.pk/), 2018

32.Fadda, M. T., Ierardo, G., Ladniak, B., Di Giorgio, G., Caporlingua, A., Raponi, I., Silvestri, A., & Group of Apert syndrome, Policlinico Umberto I, “Sapienza” University of Rome, Italy (2015). Treatment timing and multidisciplinary approach in Apert syndrome. Annali di stomatologia, 6(2), 58–63.

33.Atamah, A, Dawodu, OA, Okeigbemen, V, Osahon, AI, "Ophthalmic Emergencies in Benin City, Nigeria", 'African Journals Online (AJOL)', 2009

34.Avadhanam, Venkata, Liu, Christopher, Smith, Helen, "Keratoprostheses for corneal blindness: a review of contemporary devices", 'Dove Medical Press Ltd.', 2015

35.A Ajayi, Iyiade, Bodunde, Olanike F, J Omotoye, Olusola, O Ajite, K.ayode, "Factors Responsible for Poor Visual Outcome Following Emergency Eye Surgery in a Tertiary Eye Centre", 'African Journals Online (AJOL)', 2019

36.Skoblo, Mera, "Retinal Detachment: What are the Types and Potential Causes?", Touro Scholar, 2022

37.Brezin A. P., Burdon M., Choragiewicz T., Cummings A. B., Evren Kemer O., Malyugin B. E., Posarelli C., Prieto I., Rejdak R., Teus M. A., Tognetto D., Tornblom R., Toro M. D., "Early impact of COVID-19 outbreak on eye care: Insights from EUROCOVCAT group", 'SAGE Publications', 2020

38.Somani, B. K., Nabi, G., Thorpe, P., & McClinton, S. (2006). Endovascular control of haemorrhagic urological emergencies: an observational study. BMC urology, 6, 27. https://doi.org/10.1186/1471-2490-6-27

39.Skoblo, Mera, "Retinal Detachment: What are the Types and Potential Causes?", Touro Scholar, 2022

40.Buljac-Samardzic, M. (Martina), Doekhie, K.D. (Kirti), Wijngaarden, J.D.H. (Jeroen) van, "Interventions to improve team effectiveness within health care", 'Springer Science and Business Media LLC', 2020

41.Sanders, Genny, "A bundle of care for prevention, early recognition, and treatment of hyaluronic acid dermal filler associated vascular occlusion", ThinkIR: The University of Louisville\u27s Institutional Repository, 2024

42.Hinton, Lisa, Knight, Marian, Locock, Louise, "Partner Experiences of “Near-Miss” Events in Pregnancy and Childbirth in the UK : A Qualitative Study", 'Public Library of Science (PLoS)', 2014

43. Mattoo, Aaditya & Rathindran, Randeep, 2005. "Does health insurance impede trade inhealth care services?," Policy Research Working Paper Series 3667, The World Bank.

44. Maiassi, N., Xanthopoulou, K., Löw, U., & Seitz, B. (2022). The Impact of the First COVID-19 Lockdown Period on the Inpatient and Outpatient Volume of a University Based Tertiary Referral Center with Corneal Subspecialization in Germany. Clinical ophthalmology (Auckland, N.Z.), 16, 1795–1805. https://doi.org/10.2147/OPTH.S335551

45. Daher, Isabelle Dalloul, Ferrari, Rafaella Scalabrini, Liedtke, Fernanda Soubhia, Moura, Malú Inês Peres, Murad, Ana Cristyna Saad, Neiva, Eneidia Batista, Vilerá, Gabriella Carolina, "Major ophthalmological outcomes of the e-learning process in children and guidelines at COVID-19: a concise systematic review", Zotarelli-Filho Scientific Works, 2022

46. Allen, Deborah I., Chowdhury, Shabnam, Kochhar, Komal, Reger, Michael K., Zollinger, Terrell W., "Report of Responses to the 2003, 2005 and 2007 Indiana Physician Surveys", 2009

47.González Andrades, Miguel, Lacorzana, Javier, Ortiz Pérez, Santiago, "Cambios en el patrón de uso de los servicios de urgencias en un complejo hospitalario terciario español sobresaturado durante la pandemia de COVID-19", 'Real Academia de Medicina y Cirugia de Andalucia Oriental', 2022

48.Compeyrot-Lacassagne, Sandrine, Shivpuri, Abhay, Solebo, Ameenat Lola, Turtsevich, Inga, "Pediatric uveitis: Role of the pediatrician", Frontiers Media SA, 2022

49.Ambreen Gul , Ali Raza , Ambreen Gul , Ali Raza, "Visual Outcome of Open Globe Injuries in Paediatric Patients",Rawalpindi Medical University, Rawalpindi, Pakistan (https://rmur.edu.pk/), 2018

50.Dua, H. S., Ting, D. S. J., Al Saadi, A., & Said, D. G. (2020). Chemical eye injury: pathophysiology, assessment and management. Eye (London, England), 34(11), 2001–2019. https://doi.org/10.1038/s41433-020-1026-6

51. Law SK, Song BJ, Yu F, Kurbanyan K, Yang TA, Caprioli J. Hemorrhagic complications from glaucoma surgery in patients on anticoagulation therapy or antiplatelet therapy. Am J Ophthalmol 2008;145:736-46

52.Stuart, S., Parrington, L., Martini, D., Peterka, R., Chesnutt, J., & King, L. (2020). The Measurement of Eye Movements in Mild Traumatic Brain Injury: A Structured Review of an Emerging Area. Frontiers in sports and active living, 2, 5. https://doi.org/10.3389/fspor.2020.00005

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IN OCULAR EMERGENCIES