

Perioperative nuances of cataract surgery in ocular surface disorders

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Ocular surface disorders (OSDs) constitute a varied spectrum of conditions that could be associated with dryness, compromised limbal status, varying grades of forniceal obliteration, corneal scars, and a possible underlying immune etiology. These associations adversely impact surgical outcomes in the eye. One of the treatable causes of decreased vision in these eyes is cataracts which could be secondary to the disease, its treatment, or age-related. The compromised ocular surface status can interfere with decision-making regarding the technique of cataract surgery, preoperative biometry for intraocular lens (IOL) power calculation, and intraoperative visibility, increasing the possibility of complications and compromising the final visual outcome. The postoperative course can be affected by complications, including melt and infection. Stabilization of the ocular surface by medical or surgical means, and appropriate management of underlying immune etiology, if any, helps improve and maintain a healthy ocular surface, optimizing cataract outcomes. With the help of pre, intra, and postoperative tools and means, such as punctal occlusion, ocular surface reconstruction, systemic immunosuppression, illuminators, capsule staining dyes, optical iridectomy, prosthetic replacement of the ocular surface ecosystem (PROSE) lenses, and others, the visual outcome post-cataract surgery in these eyes can be maximized. This article highlights the nuances of performing cataract surgery in various OSDs and the need to have a comprehensive stepwise approach is emphasized.

Key words: Cataract, cornea, dry eye, limbal stem cell deficiency, ocular surface, SJS, pterygium

The ocular surface comprises the eyelids, tear film, conjunctiva, limbus, and cornea. All the components of the ocular surface function in perfect harmony in normal health to maintain ocular surface homeostasis. A disruption in the function or structure of any of these could lead to a dysfunction of the ocular surface, termed as ocular surface disorders (OSDs). OSDs constitute a varied spectrum of conditions ranging from mild dry eye to chronic cicatrizing conjunctivitis causing forniceal shortening, corneal scarring, exposure, and severe dry eye with or without underlying immune-mediated etiology. The ramifications of OSD on any ophthalmic surgery and its outcomes are many.^[1]

Cataracts are the most common cause of preventable blindness worldwide and the most commonly performed surgery by ophthalmologists. Though cataract surgery has been an ever-evolving field, increasing the safety and the efficacy of the procedure, the challenges increase exponentially when associated with OSDs. The incidence of OSD in patients presenting for cataract surgery has been reported to be over 80%, and almost 50% of asymptomatic patients have abnormal tear osmolarity or matrix metalloproteinase -9 (MMP-9) levels.^[2,3] A broad overview of OSDs and an understanding of their implications on various aspects of cataract surgery is essential for every ophthalmologist performing cataract surgeries to overcome avoidable intra and postoperative surprises.

OSDs can impact cataract surgery in various ways, and several perioperative nuances are to be borne in mind. Decision-making is crucial with regards to ensuring adequate immunosuppression of the underlying immune etiology if any, and the appropriate preoperative measures to ensure a good outcome. It can impact preoperative biometry assessment, the choice of surgical technique due to poor visibility, and increase the possibility of postoperative complications, thus leading to unsatisfactory visual outcomes. To address these concerns, the American Society of Cataract and Refractive Surgeon's (ASCRS) Cornea Clinical Committee developed a new consensus-based practical diagnostic OSD algorithm to aid surgeons in efficiently diagnosing and treating visually significant OSD before any form of refractive surgery is performed.^[4] The algorithm provides a broad overview of diagnosing OSD; however, the concerns with each of them specifically related to cataract surgery were beyond the scope of this algorithm.

This article aims to provide a comprehensive approach to the problems faced, the finer intraoperative nuances, and details pertaining to the perioperative ocular and systemic care in dealing with cataract surgery with varied OSDs. These include the more commonly encountered dry eye, allergic eye disorders, pterygium postocular burns, and immune conditions

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like Stevens–Johnson syndrome (SJS), ocular cicatricial pemphigoid (OCP), Sjogren’s syndrome (SS), and peripheral ulcerative keratitis (PUK). The preoperative assessment regarding factors that contribute to a hostile ocular surface, the extent of limbal stem cell deficiency (LSCD), if any, the presence of corneal scarring and its impact on biometry assessment, and intraoperative nuances that are common to all OSDs are collectively dealt with. Specific perioperative care that differs with each condition has been dealt with separately.

Causes for Cataracts in OSD

Cataracts in eyes with associated OSD could be independent of the underlying disease pathology. However, cataracts can be caused by the disease process or its management. This includes most commonly the following factors:

- Steroid-induced cataract
- Intraocular inflammation-related cataract, especially in eyes that have had a previous corneal micro or macro perforation
- Age-related.

The management of the cataract, however, follows similar guidelines, irrespective of the etiology. The parameters in assessment and management that need specific focus have been elucidated below.^[4,5]

Common Challenges in Cataract Surgery with Associated OSD

Apart from the choice of intraocular lens (IOL) and type of cataract surgery, inaccurate biometry and deficient media clarity appear to be the glaring challenges one would face while considering cataract surgery in these eyes. Several nuances and norms have to be adhered to in these eyes to maximize the outcome.^[6] Exacerbation of the underlying immune etiology is a threat to the postoperative outcome and must be addressed in consultation with an immunologist or rheumatologist.^[7,8] The presence of dryness along with the underlying systemic immunological dysfunction, if any, predisposes the ocular surface to a series of inflammatory

events initiated by surgical trauma leading to corneal melts and perforation.^[9]

Preoperative Assessment

OSDs can be categorized into immunological and non-immunological disorders. Eyes with an underlying immunological disease are best co-managed with an immunologist or rheumatologist, depending on the particular condition.^[4,5,9]

Alternatively, these conditions can be grouped based on the ocular surface components, facilitating a sequence and ease of preoperative clinical examination, ensuring that important red flags are not missed. Factors that must be assessed in detail preoperatively have been highlighted in Table 1, with the possible impact they might have if overlooked or neglected.

Counseling

Counseling forms the most important aspect of cataract surgery in eyes with OSD. It is crucial to prime the patient of postoperative symptoms, the need for prolonged postoperative care, and the possibility of increased risk of complications. Postoperative ametropia should also be discussed, and the need to address it with adjunctive measures such as contact lenses or, in select instances, laser refractive correction.

Ocular surface component assessment

An anatomical perspective to assessment and management of OSD before cataract surgery helps to ensure a comprehensive approach and avoid omissions that might impact intra and postoperative outcomes.

Fluorescein corneal staining

Assessing corneal staining forms an important examination in all preoperative eyes and should not be ignored. Not only does it reveal the presence of punctate epitheliopathy that can otherwise be missed entirely, but it also impacts decision-making.^[1,3,4] It helps diagnose and grade the severity of dry eye and prompts the need to look for contributing factors in the absence of a dry eye.

Table 1: Preoperative Assessment and Planning in Cataract Surgery with OSD

	Seen In	Possible Impact
Lids	MGD Malposition Trichiasis/Entropion/Ectropion Lid margin keratinization	Secondary Infection Epithelial defect Secondary Infection
Tear Film status	ATD	Punctate epitheliopathy Non-healing epithelial defect Secondary Infection
Forniceal Shortening	SJS/OCP/Chemical Burn/ Trachoma/Post-ptyerygium excision	Rule out underlying immune etiology Need to address only if interfering with cataract surgery
Pterygium		Sequential vs simultaneous surgery
Conjunctivochalasis		Can worsen post peribulbar or subtenon injection
Corneal Staining	Dry Eye Other Causes	
LSCD	SJS/OCP/Chemical Injuries	Address LSCD, when indicated* Avoid de-epithelizing cornea to improve intraoperative visualization
Corneal Scarring	Trachoma, Post-ptyerygium surgery, Immune conditions, Others	Preoperative IOL power calculation Intraoperatively hinders visualization Postoperative adjunct to improve vision

The need to plan for punctal occlusion, refer to a rheumatologist in the presence of aqueous tear deficiency (ATD) if indicated, and avoid topical preparations that can lead to toxicity on the surface, is determined by the extent and cause of corneal staining. Based on the pattern of staining, one needs to rule out lagophthalmos, dry eye, neurotrophic keratitis, and toxic medicamentosa, among other causes. A moderate to severe grade of corneal staining warrants further assessment before cataract surgery.^[6,7]

A simple fluorescein staining, in addition, provides crucial information regarding the tear breakup time and can highlight the presence of conjunctivochalasis, an oft missed cause for initiation or exacerbation of symptoms post-cataract surgery.^[10]

Lids

Adnexal disorders

Trichiasis, entropion, and ectropion causing ocular surface staining and patient symptoms are best addressed preoperatively before planning cataract surgery. This prevents the possible occurrence of a non-healing epithelial defect and/or a secondary infection in the postoperative period.^[11,12]

Lid wiper epitheliopathy

Staining of the lid margin along the line of Marx can be a cause for patient symptoms and signs in the pre and post-cataract phase. Everting the lid post staining helps detect these changes that could adversely impact patient comfort.

Lid margin keratinization (LMK)

Seen most commonly in patients with SJS, LMK might rarely be associated with other OSDs. LMK causing harmful effects on the cornea, including punctate staining and vascularization due to the blink-induced microtrauma, should be corrected before performing any intraocular procedure.^[11] This is done by means of excision of the keratinized strip of conjunctiva and replacement with a mucus membrane graft.^[13] By improving and stabilizing the ocular surface, it contributes to improved post-cataract outcomes and reduced occurrence of complications that LMK can cause in the postoperative period.^[13,14]

Tear film

The exact incidence of dry eye disease (DED) in cataract patients is unknown. Most of the time, patients might be asymptomatic in the earlier stages, or symptoms like blurred vision can be easily confused and contributed to the cataract rather than the DED. Gupta *et al.*^[15] reported almost 80% of patients had at least one abnormal test indicative of ocular surface disease before surgery in a prospective series of 120 patients. However, multiple reports are indicating an association between cataract surgery and the development or exacerbation of DED.^[16,17] Gibbons *et al.*^[18] reported 35% of patient dissatisfaction post routine cataract surgery related to dry eyes.

Disturbance in any component of the tear film could cause DED. Meibomian gland dysfunction (MGD), especially when associated with meibomian cysts, meibomian foam, cheesy meibomian secretions, recurrent marginal keratitis, and internal hordeolum, should be treated adequately before any intraocular procedure.^[19] The etiology for ATD determined by a reduced tear meniscus height (TMH) and Schirmer's I wetting warrants further investigation. Advanced age, certain systemic medications, and post-menopausal hormonal changes can impact the dry eye status and needs to be borne in mind.^[20] It is imperative to look for any evidence of conjunctival

cicatrization, and rule out past herpetic infection, trauma, and conjunctivitis, that could be plausible factors for the ATD. Beyond these, an association with dryness of the mouth and/or small joint pains could be a pointer towards SS requiring a rheumatologist's evaluation.^[1,20]

An unstable tear film and corneal punctate staining can cause variability in keratometry measurements with corresponding variations in IOL power calculations.^[3,6] The surgical visibility could be compromised, and there is a higher risk of developing postoperative complications such as epithelial defects, corneal melts, infection, impaired visual outcome, and exacerbation of pre-existing dry eye. The risk is more in eyes with moderate to severe ATD. Tear Film and Ocular Surface Society's (TFOS) Dry Eye Workshop (DEWS) II reports that aqueous deficient and evaporative dry eye exist as a continuum and not as separate entities; thus, both need to be considered in diagnosis and management.^[20] The use of preservative-free lubricants, autologous serum tears, and punctal occlusion by means of plugs or cautery help reduce the dry eye-induced inflammation and the occurrence of dryness-induced complications in the postoperative period.^[21,22]

Conjunctiva

Normal luster and adequate stretch of the conjunctiva over the globe are crucial for ocular surface health. Attention should be paid to rule out degenerative, inflammatory, and immune conditions of the conjunctiva during preoperative evaluation.

Forniceal shortening

In most instances, forniceal shortening need not be proactively corrected unless it is

- Directly interfering with access to performing cataract surgery
- Interfering significantly with and creating an unstable tear film
- Precluding the fitting of a scleral contact lens that might be required postoperatively to address associated dryness and corneal scarring.

In these instances, the fornix reconstruction should be undertaken before cataract surgery with the supportive need of amniotic and/or mucus membrane grafting.^[11,12] In conditions associated with an underlying immune etiology, appropriate care should be undertaken as described in the relevant sections below.

LSCD

LSCD could be partial or total, and the associated corneal findings could preclude preoperative assessment as well as impact intraoperative nuances.^[23] In eyes with a partial LSCD, with a clear central cornea, cataract surgery will offer improved visual outcomes with appropriate adjuvant therapy. In unilateral total LSCD, stem cell transplant techniques can be performed to address the LSCD before planning cataract surgery.^[24] In bilateral severely affected eyes, with some retained visibility of anterior segment details, which would not significantly preclude intraoperative visualization, cataract extraction can be attempted, if dense.

This is especially applicable in near-end-stage bilateral OSDs with the drop in vision attributable to the progression in cataracts. This would serve as a penultimate attempt in visual rehabilitation in eyes with relatively retained corneal clarity before deciding on the need for a keratoprosthesis, if eligible

or indicated. The visual outcome would need to be enhanced with the use of scleral lenses.^[25] The possible occurrence of an epithelial defect in the postoperative period must be borne in mind and specifically looked for.

Corneal scarring

The occurrence of corneal scars in eyes with OSD could be multifactorial.^[4,5,9,14] Most commonly, these occur secondary to a non-healing epithelial defect during some prior stage of the disease, following healing of corneal infection or secondary to the associated LSCD.

Central corneal scars are routinely seen in trachomatous eyes and following surgical excision of a large recurrent pterygium encroaching the visual axis. Rarely, an integrated amniotic membrane can cause a long-standing haze or opacity. These scars are usually associated with vascularization, could be of varying intensity, in varied locations on the cornea (essentially, central scars have a more direct bearing on cataract surgery), and can accompany corneal thinning.

The scars impact pre, intra, and postoperative cataract surgery in multiple ways including difficulty in appreciation and grading of cataracts through the opacity, the surface irregularity that leads to distorted biometry assessment, the challenges caused in intraoperative visualization, decision making to perform simultaneous optical iridectomy, preoperative assessment with a rigid gas permeable (RGP)/scleral contact lens to ensure fitting and comfort, in the possible need for the same later and postoperative ametropia.

For post-ptyerygium scars/non-immunologic condition-related scars, precataract superficial keratectomy or phototherapeutic keratectomy (PTK) or lamellar keratoplasty (LK) with amniotic membrane transplantation (AMT) can be performed to improve the corneal surface, clarity, and therefore IOL power calculation.

Choosing an IOL in OSD

The choice of IOL and the IOL power calculation form the most important and challenging aspect of cataract surgery in eyes with associated OSD.

In scarred corneas, the average keratometry value obtained on corneal topography over the corneal center is utilized for IOL power calculation. In cases of significant distortion in the keratometric value, standard keratometry would aid in IOL calculation. The keratometry of the other eye would be of limited value in these circumstances. If standard keratometry value is being employed, the need for postoperative contact lenses should be communicated to the patient. In extreme cases wherein the scar is dense, preoperative counseling should include the possible need for a keratoplasty, if eligible, based on postoperative visual outcome.^[5,11,26]

The use of premium multifocal IOLs is generally not recommended as the inherent reduced contrast sensitivity of these IOLs further magnifies the already compromised quality of vision due to dryness. Multifocal and toric IOLs are best avoided in eyes with OSDs considering that these are dynamic conditions that can worsen with time with regards to dryness and corneal staining. These are factors that negatively impact the outcome of premium IOLs. Zero asphericity lenses are best

Table 2: Intraoperative Nuances

1. Prophylactic preservative free topical antibiotic in view of altered surface commensals
2. Topical/Local or general anesthesia
3. Avoid excessive irrigation, phototoxicity, surgical trauma
4. Prefer clear corneal phacoemulsification (Can perform SICS/ECCE when and if indicated)
5. Surgeon's choice for the site of incision, to avoid areas of peripheral corneal thinning
6. Coating the cornea with viscoelastic to improve visualization
7. Avoid removing corneal epithelium to improve visualization
8. Anterior capsule staining with trypan blue
9. Endoillumination and a good retroillumination to improve visualization - in case of corneal opacity
10. Optical iridectomy, when indicated
11. Low threshold for wound suturing, when in doubt
12. Can consider intraocular antibiotic steroid injection to avoid postoperative topicals, and hence toxicity
13. Avoid postoperative NSAIDs, use PF lubricants and antibiotics
14. Avoid premium multifocal IOL's

suited in these conditions wherein the corneal asphericity is affected. The decision to place a 3-piece IOL with haptics in the sulcus would be warranted intraoperatively in case of inability to visualize the capsulorrhexis edge.^[6]

Intraoperative Nuances

A good preoperative assessment prepares the cataract surgeon for intraoperative challenges and addresses the same, ensuring a good outcome. Pertinent intraoperative nuances are listed in Table 2.

In addition, since the size of the surgical incision plays a major contributory role, clear corneal phacoemulsification is preferred; however, the choice of surgical technique is based on the media clarity, available surgical field, and the density of the cataract. The ocular surface effects of both phacoemulsification and small incision cataract surgery (SICS) are similar. Although the incision size is more in SICS, the surgical time is less.^[27] However, both have a significant advantage over extracapsular cataract extraction. Femto-assisted laser cataract surgery may have a higher possibility of developing dry eye as compared to phacoemulsification because of the additional ocular surface trauma caused by the suction ring damaging the corneal/conjunctival epithelial cells, conjunctival goblet cells, and increased intraoperative time for the laser application, though more studies are required to confirm the same.^[28] Any intraoperative complication encountered is managed as in a routine situation unless visualization precludes the same. The rare possibility of postoperative aphakia should be borne in mind, and patients accordingly counseled.

Postoperative Care

Postoperative care is of utmost importance in these eyes. The treatment of DED should continue with appropriate lubricants, mucin secretagogues, punctal occlusion, or anti-inflammatory therapy and can be broadly based on DEWS II management principles.^[21] The addition of lubricants with macromolecular

complex and topical cyclosporine 0.05% are beneficial post-cataract surgery.^[29] Topical steroids and antibiotics routinely prescribed in the postoperative regime should be discontinued appropriately to avoid drug-induced toxicity.

Role of dropless cataract surgeries

The role of intracameral moxifloxacin and steroid cannot be underemphasized in these eyes that are predisposed to ocular toxicity from the use of postoperative topical medications.

A combination of moxifloxacin (1 mg or 5 mg/ml) with triamcinolone (15 mg) or dexamethasone (1 mg), not yet widely available, to be injected intracamerally/intravitreally or sustained-release preparations, at the end of surgery may have an important role in these eyes. In addition to being of advantage to reduce surface toxicity, physical disability in arthritis that precludes easy self-instillation of the drop can be overcome.^[30]

Issues post-cataract surgery

Despite adequate control of underlying systemic conditions, there can be worsening of dry eye symptoms, corneal epithelial defect, melt, or infections, mandating a close follow-up of such patients along with timely management of complications.

Post cataract surgery ametropia is common in these eyes and needs to be approached cautiously in severely dry eyes and eyes with an immunological condition. In other eyes, glasses and rigid contact lenses can help improve vision in the presence of corneal scarring. Photorefractive keratectomy alone or with PTK can be performed in select eyes (non-immune etiology) to correct minimal residual refractive error and/or superficial corneal scars. Scleral contact lenses form an important addition to the management armamentarium to improve post-cataract patient comfort and vision in the presence of dry eye and corneal scars.^[11,25,26]

Specific Disease Conditions

Preferred practice patterns vary based on the nature of the underlying OSD, with specific precautions applicable to each disease. Several broad guidelines applicable commonly across these conditions have been discussed earlier. This section deals with individual disease conditions highlighting pertinent points to be borne in mind while planning for cataract surgery.

MGD and pterygium are the most common associated OSDs with cataracts, and in certain regions, trachoma continues to be a cause of corneal scars and OSD. The perioperative approach to cataract surgery in these conditions, including dry eye, allergic conjunctivitis, SJS, OCP, PUK, and Mooren's ulcer, has been described below, highlighting important points in Tables 3-8.

Dry eye

In patients with ATD without a discernible cause, it is essential to rule out SS in consultation with a rheumatologist. In patients with SS, it is imperative to ensure the target score for disease activity has been achieved before undertaking cataract surgery.^[4,7] Being an elective procedure, this should be ensured. The ongoing disease-modifying anti-rheumatic drug (DMARD) should be continued during the surgery. In case of an emergency cataract surgery, the need for additional systemic steroids based on the level of disease activity should be discussed with the rheumatologist and administered. In the meantime, the ocular

Table 3: Pertinent points for cataract surgery in dry eye

ATD	MGD
Investigate for the cause of ATD	Treat MGD preoperatively
Suspect Sjogren's syndrome - refer to a rheumatologist	
Elective cataract surgery to be undertaken when the underlying condition is in remission or low disease activity under cover of immunomodulators/DMARD, in consultation with a rheumatologist	Rule out and treat associated conditions such as acne rosacea, atopy, and psoriasis in consultation with a dermatologist
Emergency cataract surgery may warrant perioperative systemic steroids based on underlying disease activity	
For any ATD, treat the ocular surface with topical lubricants, autologous serum, topical cyclosporine/tear retentive measures like plugs or cautery, as indicated, precataract surgery	
A temporary tarsorrhaphy can be placed post-cataract surgery in severely dry eyes	
Prefer PF lubricants and antibiotics, and avoid NSAIDs	

surface status should be improved adequately [Fig. 1a-d] with a combination of the use of topical lubricants, punctal occlusion, and/or topical cyclosporine 0.05%.^[21,29]

Specific care to be exercised in these eyes is highlighted in Table 3.

Pterygium

Cataracts and pterygium can co-exist in the older adult population. Depending on the size of the pterygium, it can have a variable impact on corneal curvature.^[31] Modern cataract surgery is often considered as a refractive procedure with increased patient expectations. A clinical decision has to be made about whether to simultaneously operate cataracts and pterygium or to perform them sequentially to obtain an optimal visual outcome.^[32,33] Additional procedures such as limbal relaxing incision or implantation of toric IOL should ideally be avoided when performing a combined surgery, especially with large pterygium. Though each case should be approached as is appropriate, certain broad guidelines have been highlighted in Table 4.

Allergic conjunctivitis

Vernal (VKC) and atopic (AKC) keratoconjunctivitis are bilateral chronic allergic conditions associated more with cataract, which is disease or treatment-related. Chronic steroid use in both and significant inflammation in AKC are the contributing factors.

Chronic steroid use causing a posterior subcapsular cataract is mostly seen in refractory cases where tapering or stopping steroids causes a recurrence of disease activity. In most instances, these steroid responders would also have raised intraocular pressure too.^[34] Chronic inflammation and recurrent episodes can lead to keratoconus, frequent shield

Table 4: Guidelines for Cataract Surgery in Coexistent Pterygium

Concerns	Approach
Corneal Astigmatism and surface irregularity - interfering with IOL power calculation	When the horizontal length of pterygium >2.5 mm, plan sequential surgery <2.5 mm can plan simultaneous surgery if preoperative keratometry values are not distorted If there is significant induced astigmatism, plan sequential surgery with removal of pterygium first followed by cataract surgery, usually 4-12 weeks later once the corneal topography is stable.
The time between pterygium and cataract surgery	Usually 4-12 weeks
Simultaneous pterygium and cataract surgery in patients with pterygium >2.5 mm (for specific reasons)	Increases the predicted IOL power: 0.5 D smaller than the calculated IOL power Use of topical steroids with a bandage contact lens (BCL) in the immediate postoperative period with an epithelial defect might increase the possibility of infection. Early postoperative follow-up till healing of epithelial defect at the site of pterygium.
Corneal scarring	Can consider PTK or superficial keratectomy to remove the scar, if significant, and regularize the corneal surface For residual regular astigmatism, toric IOL can be considered Endoillumination to improve visualization
Recurrent Pterygium	Preferable to address recurrent Pterygium before planning cataract surgery along with appropriate use of adjunctive treatment including conjunctival autograft, amniotic membrane, intraoperative application of MMC (0.04%)

Table 5: Points of Concern for Cataract Surgery in Allergic Conjunctivitis

Points of Concern	Approach
Shield ulcer-related corneal scars	Can interfere with biometry and intraoperative visualization
Steroid-induced glaucoma	IOP must be controlled with medical management, sequential or simultaneous glaucoma surgical procedures
Associated Keratoconus	To be managed and stabilized before planning cataract surgery
LSCD	Usually bilateral, if the central cornea is relatively clear, can plan cataract surgery

The underlying allergic disease needs to be appropriately controlled before/ along with management of the above

ulcers causing corneal scarring, and LSCD, thus interfering with keratometry and surgical view and bringing forth their challenges addressed in Table 5.

Adequate disease control and a quiet eye are recommended before planning cataract surgery with either appropriate topical management, surgical intervention, or if required, systemic immunosuppression [Fig. 1e-h].

Table 6: Pertinent Issues in Cataract Surgery in Chemical Injury

Acute Stage	Chronic Stage
Commonly associated with alkali injury	Elective surgery planned 3-4 months after the injury or previous surgical intervention
Usually intumescent with raised IOP	Done following management of LSCD, corneal scarring if any [Fig. 2a-c]
Control IOP, preoperative IV mannitol	Plan simultaneous optical iridectomy, where indicated
IOL can be planned as a secondary procedure [Fig. 1i and j]	Address associated glaucoma, if any, aggressively
May require endoillumination if associated with corneal haze	

Table 7: SJS - Preoperative Evaluation and Approach for Cataract Surgery

Concerns	Approach
Dry Eye	Punctal occlusion (plugs or cautery)
LMK	Excision with MMG/in very mild cases PROSE lenses will offer protection/though the lens power can change after cataract surgery
Fornix shortening	Need not be actively addressed unless affecting incision and exposure for cataract surgery or precluding fitting of PROSE lens
Adnexal disorders	Needs to be appropriately addressed
Corneal opacity	Plan for an optical iridectomy Post-cataract PROSE lens

The role of systemic immunosuppression is very limited

Chemical injury

In chemical injuries caused due to acids or alkalis, cataracts can occur in the acute stage because of inflammation or later because of prolonged steroid use or secondary to chronic inflammation.^[5,35] Based on the stage at which cataract surgery is being performed, certain important points need to be borne in mind and have been highlighted in Table 6.

SJS

In eyes with chronic ocular sequelae of SJS, it is essential to ensure that procedures to stabilize the ocular surface have been carried out before undertaking cataract surgery [Fig. 2d-i].^[14,26,36] Rarely cataracts could be an issue in the acute stage, and general treatment principles should be followed [Fig. 1k and l]. A broad outline of the principles to be followed while performing cataract surgery in eyes post-SJS has been highlighted in Table 7.

OCP

The prime concern of cataract surgery in OCP is related to the exacerbation of the underlying disease. Any conjunctival manipulation, including a subconjunctival injection, can exacerbate the disease if not adequately controlled.^[8,12] Clear corneal phacoemulsification without conjunctival handling usually does not predispose to an exacerbation. However, the disease must be under control with appropriate

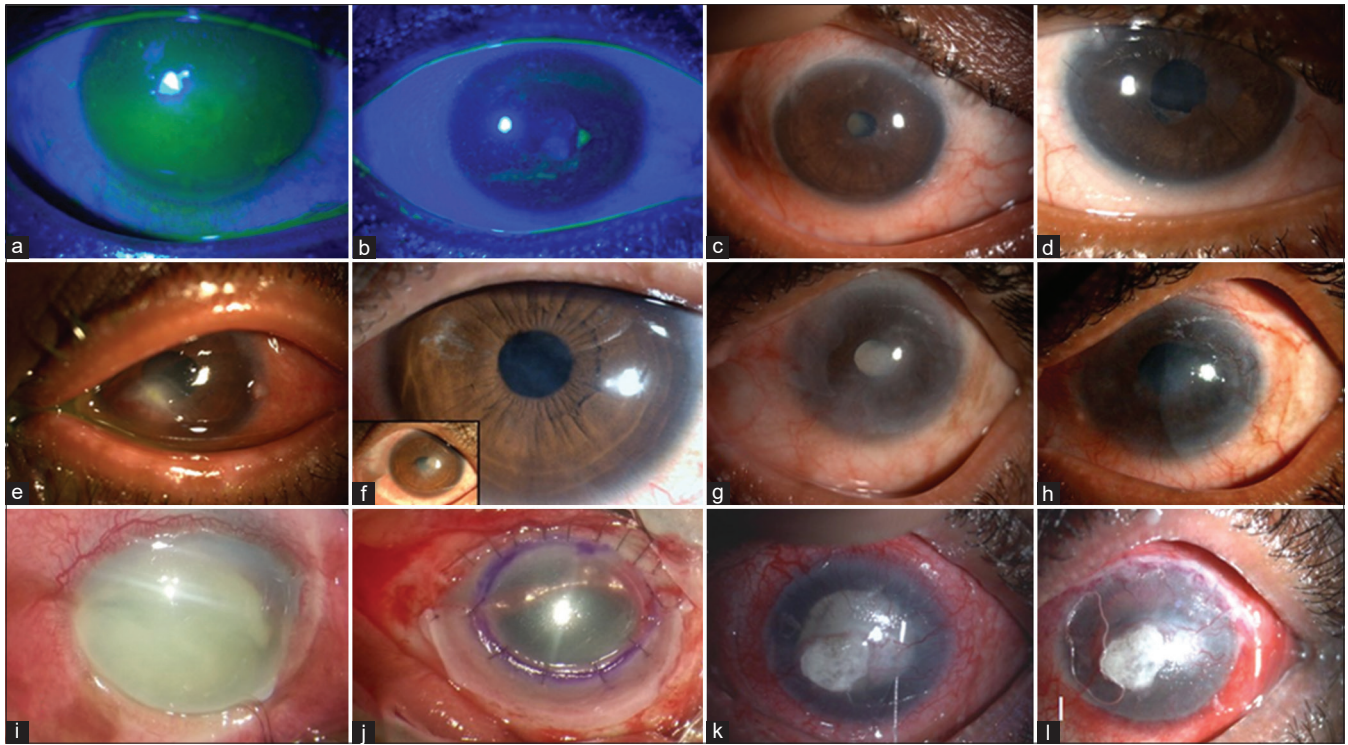


Figure 1: Pre (a) and post (b) punctal cautery in Sjogren’s syndrome, followed by cataract (c) surgery with improvement (d) in symptoms. Secondly infected shield ulcer (e) in an atopic that healed with scarring (f-insert). Post phacoemulsification (f) for steroid-induced cataract. Pre (g) and post (h) phacoemulsification in an atopic with corneal haze. Lens matter in the anterior chamber 15 days post chemical injury (i) underwent Extra capsular cataract extraction (ECCE) with an inferior crescentic graft for corneal thinning (j). Phacolytic glaucoma in SJS with cyanoacrylate glue (k). ECCE done under intravenous mannitol cover (l)

Table 8: OCP - Pertinent pre and intraoperative points for cataract surgery

Prerequisites	Systemic immunosuppression forms the mainstay of management are points not headings Disease should be well controlled for a minimum of 6 months before cataract surgery Active conjunctival manipulation needs disease control with systemic immunosuppression
Preferred Procedure	Clear corneal phacoemulsification procedure safest Need for additional perioperative systemic steroids based on the extent of conjunctival manipulation and current disease activity in consultation with an immunologist
DIPP Drug-induced pseudo pemphigoid	Rule out DIPP by stopping the culprit drug (most commonly topical AGM), shift to oral acetazolamide, and assess regression of inflammation Decide on the need for glaucoma surgical intervention (prefer drainage devices in case of significant conjunctival scarring), preferably under empirical perioperative systemic steroid cover In case of continued progression of cicatricial changes, treat as OCP

Conjunctival/Oral mucosal biopsy to confirm the diagnosis of OCP is preferable. In case of negative biopsy, with typical clinical features of OCP, continue to treat as OCP. To be treated in consultation with a dermatologist/immunologist

immunosuppression in consultation with an immunologist.^[12] Cataract surgery is usually recommended in OCP only when the visual loss outweighs the recurrence risk.^[8] Geerling *et al.*^[12] recommend a step-wise approach to facilitate proper wound healing; lid malpositions, trichiasis, and forniceal shortenings should be appropriately managed [Fig. 2j-l]. Intraoperatively, they recommend minimal conjunctival handling and a corneal section, using lid sutures or a lateral canthotomy to facilitate the access. The choice of surgical technique depends on the visibility, accessible surgical field, and cataract density. The principles of management are outlined in Table 8.

PUK

Mooren’s ulcer or collagen vascular conditions like rheumatoid arthritis, Wegener’s granulomatosis, and others can present as non-infectious PUK with multiple episodes of exacerbations and remissions. Systemic immunosuppression, along with topical therapy, forms the mainstay of treatment. Cataract can be mostly age-related or complicated and needs to be managed with caution in these eyes [Fig. 3].^[5,37]

The peripheral corneal thinning and scarring following resolution of melts causes irregular astigmatism interfering with biometry and placement of surgical incisions and compromising the visibility during surgery.

A tailored approach is recommended where once the disease is adequately controlled with systemic immunosuppression along with appropriate management of co-existing dryness

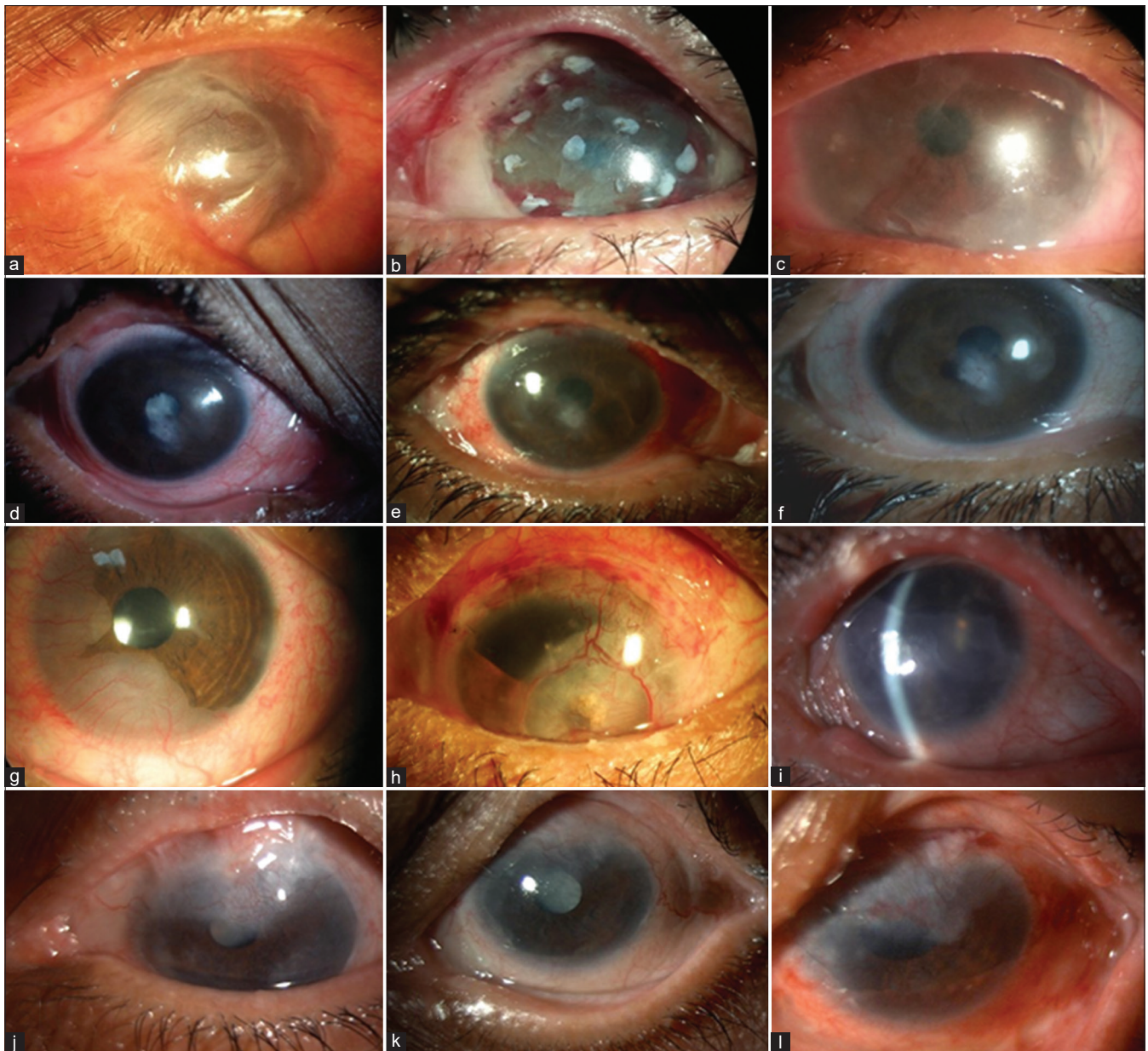


Figure 2: Symblepharon (a) post chemical injury released using amniotic membrane and autoSLET (b) for total LSCD followed by phacoemulsification (c). Total cataract (d) in SJS who underwent mucous membrane grafting and punctal cautery to stabilize the surface followed by phacoemulsification (e). Stable ocular surface for 2 years (f). Post-cataract surgery in SJS with partial LSCD (g), patch graft with optical iridectomy (h), and lackluster appearance (i). Symblepharon (j) released with amniotic membrane (k) under systemic mycophenolate cover to facilitate phacoemulsification (l) in OCP

and the disease has been in remission for an adequate period, surgery is planned. In patients with significant peripheral thinning, an annular or crescentic lamellar graft is recommended to aid placement of the incision and, if possible, regularize the corneal asymmetry. The sutures are preferably removed before biometry assessment. Since Mooren's ulcer is a corneal disease, a scleral incision is recommended. A smaller incision is preferred to reduce the possibility of corneal denervation, and the use of minimal cautery is advocated.

Conclusion

To summarize, cataract surgery in OSDs is challenging and demands a comprehensive approach to improve visual

outcomes and reduce the possibility of complications. Surface stabilization procedures, medical and/or surgical, aid in improving the milieu and prevent the postoperative breakdown of the surface. Accordingly, a comprehensive step-wise approach is recommended. The primary disease is controlled initially, the ocular surface is stabilized, and then cataract surgery is planned to improve the quality of life in these difficult situations.

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Conflicts of interest

There are no conflicts of interest.

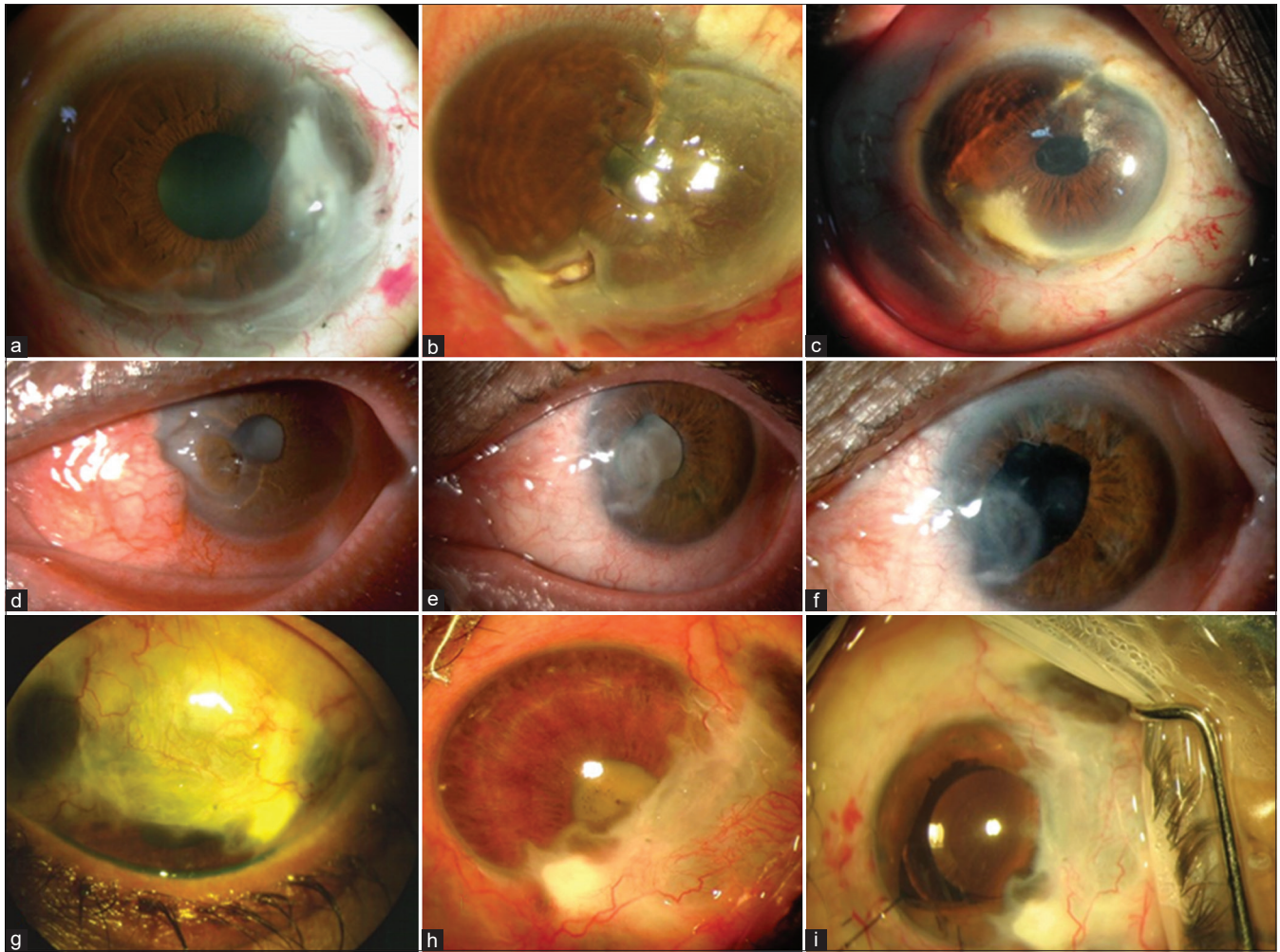


Figure 3: Peripheral ulcerative keratitis (PUK) in Mooren's ulcer (a). D-shaped graft for tectonic support (b) under systemic cyclosporine followed by phacoemulsification (c). Peripheral corneal perforation with iris prolapse in rheumatoid arthritis (d). Lamellar patch graft (e) under intravenous methylprednisolone cover with DMARD. Cataract surgery was performed (f) once the disease was in remission. Tectonic scleral patch graft (g) for scleral melt in Wegener's granulomatosis. Following control of activity with T.Cyclophosphamide, phacoemulsification (h) with intraoperative hooks (i) was performed

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