

# GIMBEL EYE CENTRE Surgery Co-Management Guide

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# The Role of the Co-Managing Eyecare Provider

As the Primary Eyecare provider, your role is important in the patient's Refractive Surgery journey, from beginning to end.

## Pre-Operative Evaluation

A full eye examination including complete ocular and health history, refractive status, and dilated ocular health evaluation is recommended prior to referring the patient to our Centre. This is advantageous to the patient because we can pre-screen the referral and handle/discuss any issues prior to the patient's arrival for Gimbel Eye Centre assessment. This is advantageous to you because it establishes your participation in the patient's experience and encourages the patient to return to you for follow up care and beyond. The data collected in your referral will be carefully evaluated in conjunction with a complete Gimbel Eye Centre assessment to maximize accuracy and repeatability in the data used for surgery purposes. There is historical precedence that it is both the Refractive Surgery Centre's and the Primary Eyecare Provider's responsibility to ensure adequate informed consent surrounding the risks and benefits of refractive surgery, including presbyopia considerations and monovision.

**Refractions:** For refractive surgery purposes: it is recommended to **maximize the cyl** and minimize the sphere component as this increases the odds of achieving emmetropia.

**Visual Acuity:** For testing standardization, we request measurements up to 20/15.

## Referrals to Gimbel Eye Centre

Pre-Operative Surgery Assessment Referral Forms (provided in this guide) can be forwarded via fax or e-mail. Our Patient Counselor will then contact the patient directly to make arrangements for a Gimbel Eye Centre preoperative assessment, surgery, and 1-day post-operative follow-up. A few things to be aware of in referring your patients:

### For All Surgery Types:

The patient is required to discontinue soft contact lens wear for a minimum of 48 hours prior to testing at Gimbel Eye Centre, or 2 weeks for RGP contact lenses.

### For Potential Phakic IOL candidates:

The patient should be prepared for **two** days of pre-operative testing at Gimbel Eye Centre and should make their travel arrangements accordingly.

## Post-Operative Evaluations

After the patient's 1-day follow up visit, we encourage the patient to return to you for their follow up care. A report will be sent to you indicating type of surgery performed and the patient's current vision status. Follow up frequency and testing will be outlined in each section of this guide. A Post-Operative Follow Up Referral form (provided in this guide) should be sent to Gimbel Eye Centre for review, and a response will be returned if requested. We are happy to reassess the patient upon your request at no additional fee. Please be advised that due to processing times, it may be several weeks before you receive co-management fees.

# Corneal Refractive Surgery Descriptions

## **IntraLase Laser Assisted In Situ Keratomileusis (IntraLASIK).**

There are two lasers used in this procedure. The IntraLase Femtosecond Laser creates a flap by introducing focused energy, which creates a CO2 bubble in between the corneal layers. The laser then creates the laser flap edge by cutting around the perimeter, leaving a superior hinge. This advanced method of flap creation avoids most of the risks of using a mechanical microkeratome blade, reducing post-operative complications such as dryness, providing better contrast sensitivity, and creating an optimal stromal bed surface. Once the flap is lifted, the Nidek Excimer Laser EC5000 CXIII re-contours the corneal surface by ablating tissue to correct the refractive error and minimizing higher order aberrations. If IntraLASIK Xtra was chosen, the KXL collagen cross linking procedure is performed (see KXL Collagen Cross linking section). The surgeon replaces the flap, taking care to ensure good flap position and adherence.

## **Photo Refractive Keratectomy (PRK)**

The surgeon loosens the corneal epithelium with an alcohol-based chemical solution and gently removes the epithelial cells. The Nidek Excimer Laser EC5000 CXIII re-contours the corneal surface by ablating tissue to correct the refractive error and minimizing higher order aberrations. If PRK Xtra was chosen, the KXL collagen cross linking procedure is performed (see KXL Collagen Cross linking section). The surgeon inserts a bandage contact lens.

## **Photo Therapeutic Keratectomy (PTK)**

This procedure is not a refractive surgery in that it is done therapeutically, primarily for corneal conditions such as scarring, haze, or recurrent corneal erosion. It is similar to PRK as described above, except the surgeon limits the laser tissue ablation to the pathology or higher order aberrations being treated and stops once sufficient pathological tissue has been removed. The surgeon then inserts a bandage contact lens and healing will be similar to PRK.

## **Astigmatic Keratotomy (AK)**

This procedure is generally done in conjunction with Intraocular surgery such as cataract surgery, and is done to reduce minor amounts of corneal astigmatism. The surgeon strategically creates a partial thickness peri-limbal incision. The length of the incision influences the amount of flattening of the steepest corneal meridian.

## **Laser Technology and Wavefront Treatment**

All patients at Gimbel Eye Centre undergo wavefront analysis, which measures the Higher Order Aberrations of the entire eye. Factors affecting Higher Order Aberrations include refractive error, corneal abnormalities (such as scars), and lenticular changes, which can impact the quality of the vision. The standard laser treatment for all Gimbel Eye Centre patients is an **aspheric, wavefront-optimized treatment**. In addition, our surgeons use **Active Tracker** technology to follow the eye's movements during laser treatment, and **Torsion Error Detection** to compensate for natural rotation of the eye while lying down. **Iris recognition technology** is used, which takes the OPD scan iris information to align the cylinder treatment axis at surgery.

# Corneal Refractive Surgery Patient Selection

## Eligibility Criteria for Corneal Refractive Surgery\*

Type of Surgery	Refractive Range	Healing Time/Time off Work	Other Considerations
<b>PRK</b>	-0.75 to -8.00D +1.00 to +2.00D cyl -0.50D to -4.00D	7-10 days healing 1 week off work 3 days discomfort	<ul style="list-style-type: none"> <li>adequate pachymetry</li> <li>acceptable corneal topography</li> <li>may be preferred for certain occupations (police)</li> <li>ease of enhancement</li> </ul>
<b>PTK</b>	any	7-10 days healing 1 week off work 3 days discomfort	<ul style="list-style-type: none"> <li>reserved for corneal pathologies such as scars, haze, or recurrent corneal erosion, higher order aberrations</li> </ul>
<b>IntraLASIK</b>	-0.75 to -8.00D +1.00 to +2.00D cyl -0.50D to -4.00D	3-5 days 3 days off work minimal discomfort	<ul style="list-style-type: none"> <li>adequate pachymetry</li> <li>acceptable corneal topography</li> <li>consider rare risk of flap dislodgement</li> </ul>
<b>AK</b>	cyl -0.50D to -2.00D Must have spherical equivalent of almost plano if this is a primary surgery orthogonal cylinder axis.	1-2 days healing minimal discomfort	<ul style="list-style-type: none"> <li>less predictable than other refractive surgery options</li> <li>acceptable corneal topography</li> <li>often done in conjunction with other procedures, thus post operative medications are those of the primary surgery.</li> </ul>

\*The patient should be at least 18 years of age, not pregnant or nursing, with at least 12 months of stable refractions (within +/-0.50D).

# Corneal Refractive Surgery Patient Selection

## Contraindications for Corneal Refractive Surgery

Category	Condition	Comments
<b>Ocular Pathology</b>	Corneal scar	PRK may be preferred due to risk of flap complication
	Endothelial Dystrophy	PRK may be preferred due to risk of endothelial cell damage with flap creation
	Map Dot Fingerprint Dystrophy and/or Recurrent Corneal Erosion	PRK may be preferred due to weak Bowman's layer
	Herpes Simplex/Zoster with history of ocular involvement	Considered on a case-by-case basis due to risk of re-activation
	Lid Disease i.e. Blepharitis	Must be pre-treated due to risk of infiltrates/ infection
	Extreme Dry Eyes	Considered on a case-by-case basis Phakic IOLs may be preferred
	Binocular Dysfunction	If prism required in glasses and/or pt experiences diplopia/headaches with contact lenses, then there may be a risk of decompensation after surgery and may require glasses with prism after surgery.
	Amblyopia (BCVA <20/40)	Pt must understand the risks/implications of doing surgery when one eye is already weak
	Nystagmus	Considered on a case-by-case basis. Consider challenges in eye stability during the surgical procedure.
	Other i.e. macular degeneration, retinal holes or tears	Priority will be given to the pathology first. Consider potential vision loss due to surgery.
<b>Systemic Pathology</b>	Autoimmune Disorders: – rheumatoid arthritis, Sjogren's syndrome, Lupus	Considered on a case-by-case basis due to risk of corneal melt Phakic IOLs may be preferred
	Gastrointestinal Disorders: – Ulcerative Colitis, Crohn's Disease, Irritable Bowel Syndrome	Considered on a case-by-case basis due to risk of inflammatory reaction. Must be in remission. Phakic IOLs may be preferred
	Diabetes	Must not have any retinopathy, and blood sugar levels should be controlled. Consider infection risk.
	Immuno-compromised patients: HIV, AIDS, Hepatitis	Prefer that the patient is on HART therapy and the virus is not detectable in the blood. Consider infection risk. For Hep B or C, consider risk of transmission.
<b>Medications</b>	Accutane, Clarus	Must be off this medication for 6 months prior to surgery due to risk of severe dryness

# Corneal Refractive Surgery Post Operative Care

## Postoperative Medication and Follow Up Regimen

Type of Corneal Surgery	Medication/Treatment Protocol	Follow Up Schedule
IntraLASIK	<b>Prednisolone 1.0%</b> <ul style="list-style-type: none"> <li>• qid x 7 days</li> </ul>	Day 1, Week 1, Month 1 Then yearly eye examinations
	<b>Vigamox 0.5%</b> <ul style="list-style-type: none"> <li>• qid x 7 days then stop</li> </ul>	
	<b>Artificial Tears:</b> <ul style="list-style-type: none"> <li>• q15-30 minutes during waking hours x 2 days, then prn</li> <li>• HYLO drops recommended</li> </ul>	
	<b>Eye Shields:</b> <ul style="list-style-type: none"> <li>• First 5-7 nights to protect the eyes/ maintain hydration</li> </ul>	
PRK/PTK	<b>Vigamox 0.5%</b> <ul style="list-style-type: none"> <li>• qid x 7 days then stop</li> </ul>	Day1, Day 3, Week 1, Month 1, Then monthly until 1 month <b>after</b> FML is discontinued, then yearly eye examinations
	<b>Gabapentin</b> <ul style="list-style-type: none"> <li>• 300 mg p.o. tid x 3 days</li> <li>• okay to use Advil or Tylenol in conjunction with Gabapentin if needed</li> </ul>	
	<b>FML 0.1%</b> <ul style="list-style-type: none"> <li>• qid x 1 month minimum (see Extended Medication Protocol next page)</li> </ul>	
	<b>Nevanac 0.1%</b> <ul style="list-style-type: none"> <li>• qid on day of surgery then prn up to qid for the first week</li> </ul>	
	<b>Tetracaine 0.5%</b> <ul style="list-style-type: none"> <li>• last resort pain eye drop prn, used sparingly</li> </ul>	
	<b>Artificial tears</b> <ul style="list-style-type: none"> <li>• q15-30 minutes-waking hours until contact lens is removed then prn</li> <li>• HYLO drops recommended</li> </ul>	
	<b>Eye Shields:</b> <ul style="list-style-type: none"> <li>• First 5-7 nights to protect the eyes/ maintain hydration</li> </ul>	
	<b>Bandage Contact Lens:</b> <ul style="list-style-type: none"> <li>• To be removed after re-epithelialization, with forceps, by Doctor</li> </ul>	

\* Additional visits should be performed as deemed clinically necessary. The post operative co-management fee includes the first 12 months of follow up, not including the yearly eye examination.

## PRK Post-Operative Extended Medication

All patients require FML qid for the first month. Taper regimen is based upon primary preoperative refraction. For patients having an enhancement, the taper regimen is determined by the initial preoperative refraction prior to the first surgery; not the current refraction.

Pre-Operative Sphere + Cyl added together	FML 0.1% Duration Guideline
<b>+2.00D to -3.00D</b>	Qid x 1 month then stop
<b>-3.00D to -5.00D</b>	Qid x 1 month Tid x 1 month Bid x 1 month Qd x 1 month then stop
<b>-5.00D or greater</b>	Qid x 2 months Tid x 1 month Bid x 1 month Bid/qd alternating x 1 month Qd x 1 month Qd every 2nd day x 1 month Then 1 gtt 2 times per week x 1 month

# Corneal Surgery Post Operative Presentation and Activity Restrictions

The following is a summary of potential symptoms and findings associated with each surgery. For the normal findings, an expected timeline for the finding to subside is provided.

(H= hours, D= days, W=Weeks, M= Months)

Type of Surgery	Normal (Time to Subside)	Not Normal	Activity Restrictions
<b>IntraLASIK</b>	VA 20/15 to 20/50 (may take 3-5 days to start improving) Foreign Body Sensation (48 H) Tearing/Photophobia (72H) Dry Eyes (up to 6M) Sub-conjunctival hemorrhages (2-3W) Ghosting/Halos/Glare (2-3M) Less contrast sensitivity (improves up to 6M but usually reaches 98% of original contrast) Epithelial edema (2-4W)	Pus-like discharge Dislocated/wrinkled flap Unusually high pain Interface cloudiness Epithelial Defect Infiltrate Epithelial cells under flap Foreign body/debris under flap Diffuse Lamellar Keratitis	<ul style="list-style-type: none"> <li>• No pets in the bed for 2 nights after surgery</li> <li>• No eye make-up for 7 days</li> <li>• No swimming, hot tub, water sports for 21 days</li> <li>• No Dusty/smoky environments for 21 days</li> <li>• No eye rubbing for 6 weeks</li> </ul>
<b>PRK/PTK</b> <b>*AK does not have the same discomfort elements as PRK and PTK</b>	VA 20/30 to 20/400 (up to 1W) Mild to severe pain (48H) Foreign body sensation (3-5D) Tearing, Photophobia (3-5D) Lid edema (3-5D) Ghost images (2-4W) Dry eyes (up to 3 M) Halo/Glare (2-3M) Drop in VA/diplopia (occurs at day 3-5 and is a result of fusion line formation)(72H) Less contrast sensitivity (improves up to 6M but usually reaches 98% of original contrast) Descemet's Folds (72H) Epithelial Defect (3-5D) Presence of Contact Lens (remove after re-epithelialization)	Pus-like discharge Infiltrate/infection Anterior chamber cells Non-healing epithelial defect (beyond 5-7 days) Raised IOP (check after 3W) Corneal haze	<ul style="list-style-type: none"> <li>• UV protection for 6 months</li> <li>• Safety glasses during appropriate activities</li> </ul>



# Corneal Refractive Surgery Complications and Treatment

This list contains the most likely observed complications. If you have any questions please contact us.

Complication	IntraLASIK	PRK/PTK/ AK	Description	Treatment
<b>Dry Eyes</b>	X	X	Common after surgery and usually improves over time although can be permanent. If severe diffuse SPK noted, consider preservative toxicity.	Traditional Dry Eye Therapy modalities
<b>Inflammation</b>	X	X	May present as whitish distinct or diffuse infiltrates sometimes in a perilimbal arcuate pattern. Risk of corneal melt in rare cases. Look for corneal thinning. May be associated with systemic autoimmune conditions.	Refer to GEC for assessment. Prompt and aggressive treatment is needed.
<b>Halos/ Starbursts</b>	X	X	Usually diminish over a few months but can be permanent and affect night driving. Patients with large pre-op pupil size should be advised of this potential risk.	Usually subsides but can use yellow tinted glasses, or Alphagan gtt prn
<b>Epithelial Ingrowth</b>	X		Migration and proliferation of epithelial cells under the flap. More common after relifting of a flap i.e. enhancements. May cause blurry vision, FBS, dryness, tearing.	Monitor, if migrating more than 1 mm consider surgical intervention.
<b>Infection</b>	X	X	Rare but possible. Ulcers, epithelial defects, haze, decrease in vision, pus-like discharge, red eye.	Contact GEC for guidance in treatment
<b>Corneal Haze</b>	X	X	With IntraLASIK can have patchy areas of haze that are not clinically significant. With PRK it appears like superficial white grainy subepithelial cells that don't stain. It typically presents within 1 month and peaks around 2-3 months before subsiding.	For PRK: Advise UV protection, treat with steroids. In rare cases, PTK may be considered.
<b>Ectasia</b>	X	X	Corneal instability resulting in refractive error, vision decline with visual distortion. Usually requires topography to diagnose.	Refer to GEC for assessment if vision affected.
<b>Flap Disturbances</b>	X		Mild wrinkles, shifting of flap, striae formation. May or may not be visually significant.	Refer to GEC for assessment.

*More on next page...*

# Corneal Refractive Surgery Complications and Treatment (con't)

Complication	Intra LASIK	PRK/PTK/AK	Description	Treatment
<b>Epithelial Erosion</b>	X	X	May result in loose epithelium, rough edges or defects especially along flap margin in IntraLASIK, or ablation zone in PRK. Foreign body sensation, pain especially when opening eyes in the morning, decrease in vision. Increases risk of DLK and epithelial ingrowth in IntraLASIK patients. May subside as eye heals further.	Copious non-preserved lubrication. Some cases may require antibiotics and/or bandage contact lens. Rarely, PTK may be considered.
<b>Diffuse Lamellar Keratitis (Sands of Sahara)</b>	X		Rapid onset, non-infectious white blood cells reaction in the interface (looks like fine white grainy cells). May have pain, blurry vision, FBS, photophobia and can rapidly progress if not aggressively treated. In early stages may be asymptomatic and limited to the periphery of the flap, and one needs to rely on clinical diagnosis. More severe cases can involve the central cornea, and present with sand-dune-like cell accumulation, hazy flap, edema and striae. Usually occurs within 1-3 days post-operatively but can also present later in cases of trauma.	Prompt and aggressive treatment is needed. Please contact GEC immediately so the surgeon can be involved in treatment as this has the potential to have permanent vision effects.
<b>Refractive Error</b>	X	X	May be due to regression (mild keratometry changes from either epithelial fill-in or prolific epithelial growth resulting in refractive error). May settle/resolve over time. May also be influenced by dry eyes, therefore dry eye therapy is recommended for all patients with post-operative refractive error.	Consider enhancement after 3 months of stable vision. Coverage is 18 months. Minimum refractive error is >0.50D. May enhance only one eye at a time. If deemed unsafe, the surgeon may advise against further surgery.

## Phakic IOL Refractive Surgery Descriptions

Phakic IOLs refer to synthetic implants that are inserted into the eye without removing the natural crystalline lens. They are considered a “premium” option as they provide superior quality of optics compared to corneal refractive surgery in all but relatively small refractive errors. They are removable, preserve remaining natural accommodation, and pose less retinal risk compared to lensectomy surgeries i.e. Refractive Lens Exchange. Please be aware that the need for special testing, calculations, and lens implant ordering times necessitates a processing time of 1-3 months from the date of the initial consultation to the actual surgery date. Gimbel Eye Centre currently performs one type of Phakic IOL surgery:

### **Implantable Collamer Lenses (ICL)**

Performed at Gimbel Eye Centre since 1997, this implant sits in the posterior chamber, supported by the sulcus and aqueous humour pressure. The new EVO ICL has the KS-Aquaport, which means an iridotomy is no longer required for myopic ICLs. For hyperopic ICLs, prior to the day of surgery, a prophylactic peripheral iridotomy will be performed (usually 2 iridotomies between the 10 and 2 o'clock position in the eye). This is done to ensure adequate aqueous flow. Occasionally a single Surgical Iridectomy will be chosen instead, if the patient's irises are very darkly pigmented. The ICL surgery takes about 15 minutes per eye, involves less than a 3mm self-sealing clear corneal incision, and usually no stitches or needles are required. After the incision is made, and the anterior chamber is filled with a viscoelastic material, the implant is placed initially in the anterior chamber. Then the plate haptics are manipulated to go behind the iris, so that the implant vaults over the natural crystalline lens. If a Toric Implant is inserted, the surgeon manipulates the implant to the desired orientation. The viscoelastic is flushed from the eye and care is taken to ensure the wound is secure. These implants are not visible to the naked eye.

# Phakic IOL Surgery Patient Selection

## Eligibility Criteria for Phakic IOL Surgery

Type of Surgery	Refractive Range	Healing Time/Time off Work	Other Considerations
ICL	-1.00D to -16.00D +1.00D to +12.00D Cylinder -0.50 to -6.00D (myopic torics only)	3 days healing 1 week off work (for numerous appointments)	<ul style="list-style-type: none"> <li>• Minimum AC depth 2.6/2.75 mm. Younger patients need more generous AC depth</li> <li>• Corneal diameter 10.50 - 13.00 mm</li> <li>• Bioptics can be considered</li> </ul>

\*The patient should be at least 18 years of age, not pregnant or nursing, with at least 12 months of stable refractions (within +/-0.50D).

## Contraindications for Phakic IOL Surgery

Category	Condition	Comments
<b>Ocular Pathology</b>	Glaucoma	May impede aqueous flow
	Pigment Dispersion Syndrome	Implant may interact with weakened iris layer, worsening the condition
	Recurrent Uveitis	Implant may exacerbate the condition
	Binocular Dysfunction	If prism required in glasses and/or pt experiences diplopia/headaches with contact lenses, then there may be a risk of decompensation after surgery
	Amblyopia	Pt must understand the risks/implications of doing surgery on an amblyopic system
	Other i.e. macular degeneration, retinal holes/tears	Priority will be given to the pathology first. Consider potential vision loss.
<b>Systemic Pathology</b>	Diabetes	Must not have any retinopathy, and blood sugar levels should be controlled. Consider infection risk.
	Immuno-compromised Patients: HIV, AIDS, Hepatitis	Prefer that the patient is on HART therapy and the virus is not detectable in the blood. Consider infection risk. For Hep B or C, consider risk of transmission.

# Phakic IOL Postoperative Care

## Postoperative Medication and Follow Up Regimen

Type of Phakic IOL Surgery	Medications/Treatment Protocol	Follow Up Schedule
ICL	<b>Prednisolone 1.0%:</b> <ul style="list-style-type: none"> <li>• qid starting day of surgery until 1 week post op</li> <li>• bid x 2 weeks</li> </ul>	Day 1, Week 2, Month 2, Month 6, Month 12, then yearly eye examinations
	<b>Vigamox 0.5%:</b> <ul style="list-style-type: none"> <li>• qid starting 1 day pre-op until 1 week post op</li> </ul>	
	<b>Emergency Medications:</b> Cyclogel 1.0% bid x 3 days Phenylephrine 10% bid x 3 days (to be taken if symptoms of brow ache, pt to first contact their follow up Doctor)	
	<b>Artificial tears:</b> q1h for 1-2 days then prn	

\*Additional visits should be performed as deemed clinically necessary. The post operative co-management fee includes the first 12 months of follow up, not including the yearly eye examination.

# Phakic IOL Post Operative Presentation and Activity Restrictions

The following is a summary of potential symptoms and findings associated with each surgery. For the normal findings, an expected timeline for the finding to subside is provided.

(H= hours, D= days, W=Weeks, M= Months)

Type of Surgery	Normal (Time to Subside)	Not Normal	Activity Restrictions
<b>ICL</b>	VA 20/15 to 20/50 (accommodation may be affected by pupil dilation) Foreign Body Sensation (48 H) Tearing/Photophobia (48H) Dry Eyes (up to 2M) Ghosting/Halos/Glare (may take a while for pupil to return to normal size )(6M) Edema at the incision side (1W) Descemet's Folds (72H) Pupil Dilation (48H) Vault 2-4+ (see next page) Orientation should be on target immediately Mild AC reaction (1-2+ cells, 1+flare)	Pus-like discharge Wound gaping/leak Unusually high pain Epithelial Defect Elevated IOP High Vault (see next page) Low to No Vault Shallow Angle Iris to Corneal touch Iris Transillumination Non resolving anterior chamber reaction Iridotomy not patent Progressively excessive deposits on the IOL Anterior subcapsular lens changes ICL is rotated (see next page) Retinal Detachment	<ul style="list-style-type: none"> <li>• No pets in the bed for 2 nights after surgery</li> <li>• No eye make-up for 7 days</li> <li>• No swimming, hot tub, water sports for 14 days</li> <li>• No Dusty/smoky environments for 14 days</li> <li>• No vigorous eye rubbing</li> <li>• Safety glasses during appropriate activities</li> </ul>

# Phakic IOL Postoperative Evaluation Considerations

The Phakic IOLs have special considerations during the follow up care. If you have any questions please contact us.

Type of Surgery	Special Consideration	Description/Evaluation	Interpretation
ICL	Vaulting	The subjective assessment of how many central IOL thicknesses could be placed in the space between the natural crystalline lens and the implant. This may be influenced by implant length, thickness, position in the sulcus, trapped viscoelastic fluid behind the implant, and PI patency. Example: 2 ICL thicknesses= 2+ vault	<ul style="list-style-type: none"> <li>• Vault less than 1+ poses risk of cataract formation</li> <li>• Vault more than 4+ poses risk of pupil block</li> </ul> <p>In both situations, GEC should be notified.</p>
	Orientation	The subjective assessment of the location of the Toric engraving on the implant haptic, in relation to a 180 degree scale. Must be done dilated to see the marking. Example: 030 degrees *Note this does NOT equal refractive error axis	<ul style="list-style-type: none"> <li>• If orientation does not match intended orientation, refractive error will be impacted</li> <li>• Consider improper implant rotation if pt presents with a significant hyperopic astigmatic error</li> </ul> <p>Example: +2.50-2.50 x 010</p>

# Phakic IOL Surgery Complications and Treatment

This list contains the most likely observed complications. If you have any questions please contact us.

Complication	Description	Treatment
<b>Pupil Block</b>	Pain, brow ache, photophobia, blur, nausea, elevated IOP. Usually occurs early post-operatively and can be associated with implant length, trapped viscoelastic fluid, or PI patency issues.	Contact GEC ASAP for guidance as the treatment varies with different causes of pupil block and amount of IOP elevation.
<b>Cataract</b>	Occurs later postoperatively (mean time is 3 years) and is often associated with low vault. It is important to distinguish implant related lens changes (anterior subcapsular) versus natural progression of age-related (nuclear sclerosis or cortical spoking).	Contact GEC for guidance in treatment. The risk of removal and replacement of the implant has to be considered (traumatic cataract).
<b>Infection</b>	Endophthalmitis is rare. Unilateral red, painful eye, anterior and/or posterior chamber reaction, blurry vision, hypopyon, white clumps in vitreous.	Contact GEC immediately for surgeon guidance as this is a potentially sight threatening condition.
<b>Intraocular Inflammation</b>	Significant AC reaction.	Aggressive steroidal treatment, contact GEC.
<b>Corneal Haze/Decompensation</b>	Descemet's folds, corneal edema, decrease in vision.	Muro 128 gtts qid, contact GEC if no improvement after 72 hours.
<b>Dry Eyes</b>	Common early post-operatively but longer term is less risk than corneal refractive surgery and similar to cataract surgery.	Traditional Dry Eye Therapy Modalities
<b>Halos/glare</b>	More common with Cachet as the lens is more anterior to pupil. Greater risk with large pupils and high correction. May subside over time.	May subside after 6 months, monitor. Alphagan gtts prn may be considered.
<b>Refractive Error</b>	May be associated with temporary corneal edema. May also be associated with implant rotation.	Consider etiology and treat accordingly. Bioptics may be considered.
<b>Implant Rotation</b>	Usually obvious by the 2-week check after surgery. Refractive error and blur are present if toric ICL. Often a hyperopic astigmatic error.	Contact GEC for surgical treatment consideration.
<b>Wound Leak</b>	Very low IOP, ache, blur. Globe soft on palpation. +/- Seidel sign. Wound may be gaping.	Contact GEC ASAP for surgical intervention, risk of endophthalmitis.



# Refractive Lens Exchange/Cataract Surgery Patient Selection

## Eligibility Criteria for Refractive Lens Exchange/Cataract Surgery

Type of Surgery	Refractive Range	Healing Time/Time Off Work	Other Considerations
<b>Refractive Lens Exchange</b>	All ranges of correction IOL powers available -10.00D to +40.00D Astigmatism: -0.75D to -11.00D Toric considered if corneal cyl >=-0.50D	3-5 days healing 3-5 days off work	<ul style="list-style-type: none"> <li>careful lifestyle review will influence implant selection</li> <li>pt is responsible for all costs</li> <li>pt must understand loss of accommodation and the limitations of lifestyle implants</li> </ul>
<b>Cataract Surgery</b>	All ranges of correction IOL powers available -10.00D to +40.00D Astigmatism: -0.75D to -11.00D Toric considered if corneal cyl >=-0.50D	3-5 days healing 3-5 days off work	<ul style="list-style-type: none"> <li>only a standard spherical implant is covered under AHC</li> <li>for all other implant choices, pt to pay the difference</li> <li>pt must understand loss of accommodation and the limitations of lifestyle implants</li> </ul>

## Contraindications for Refractive Lens Exchange/Cataract Surgery

Category	Condition	Comments
<b>Ocular Pathology</b>	Endothelial dystrophy/poor endothelial morphology	Rarely, corneal decompensation can occur, sometimes requiring corneal transplant.
	Any acute ocular condition that warrants priority treatment Example: uncontrolled glaucoma or wet macular degeneration or retinal pathology	<ul style="list-style-type: none"> <li>Priority treatment is given to the acute ocular condition before surgery.</li> <li>A risk/benefit analysis should be viewed quite differently between an elective (RLE) and medically necessary procedure (cataract surgery)</li> </ul>
<b>Systemic Pathology</b>	Immuno-compromised Patients: HIV, AIDS, Hepatitis	Prefer that the patient is on HART therapy and the virus is not detectable in the blood. Consider infection risk. For Hep B or C, consider risk of transmission.
	Congestive Heart Failure, COPD and other lung problems	If necessary, the surgery can be performed with the chest elevated 30-45 degrees.
<b>Medications</b>	Flomax	Risk of Floppy Iris Syndrome. GEC would like to be informed in advance if pt is taking this medication.

# Refractive Lens Exchange/Cataract Surgery Lifestyle Implant Choices

Careful screening of patient's lifestyle should be done prior to implant selection.

Implant Type	Description	Advantages	Disadvantages	Comments
<b>Fixed Focus (Acrysof, Acrysof Toric, Rayner T Flex Toric etc.)</b>	The traditional treatment using a fixed focus implant to either target OU distance, intermediate, near or monovision.	Highest quality optics	Only one ideal range for each eye—the patient is expected to be dependent on glasses for all other ranges.	Toric considered for corneal cyl greater than -0.50D.
<b>Monovision (same brands as above)</b>	Using a fixed focus implant targeting one eye for near (-1.00D to -2.50D).	Greater range of functional vision	Distance vision quality compromise. May affect depth perception.	Recommend trialing with contact lenses prior to surgery if possible. Please note this will not be exact demonstration of surgery due to presence of lens changes/ loss of remaining accommodation.
<b>Multifocal (Restor, Restor Toric, Rayner M Flex, Rayner M flex T, Panoptics)</b>	Power is in annular rings which splits the images in a refractive or diffractive pattern. Functions may be influenced by changes in pupil size during far/near work.	Better refractive predictability than Accommodative implants.	Loss in contrast sensitivity/distance vision quality. Potential halos or rings of lights around light sources at night.	Intermediate range is the weakest. Neural adaptation may have symptoms reduce after 2-6 months.
<b>Sulcoflex</b>	Pseudophakic supplementary IOL can provide additional sphere, toric or multifocal power to the eye.	Removable Predictable outcomes	The multifocal choice has the same disadvantages as noted above but is easily removable.	A removable option that can be done during primary surgery or as secondary surgery

# Refractive Lens Exchange/Cataract Surgery Post Operative Care

## Post Operative Medication and Follow Up Regimens

Type of Surgery	Medication/Treatment Protocol	Follow Up Schedule
Refractive Lens Exchange	<b>Vigamox 0.5%:</b> qid starting 1 day pre-op until 1 week post op	Day 1, Week 2, Week 8 then yearly eye examinations
	<b>Prednisolone 1.0%:</b> <ul style="list-style-type: none"> <li>• qid starting day of surgery until 1 week post op</li> <li>• bid x 2 weeks</li> </ul>	
	<b>Artificial Tears:</b> <ul style="list-style-type: none"> <li>• q1/2 hour x 3 days</li> <li>• prn afterwards</li> </ul>	
	<b>Glasses:</b> <ul style="list-style-type: none"> <li>• Should allow 4-6 weeks for capsular contraction before prescribing glasses for any residual refractive error.</li> </ul>	
Cataract Surgery	<b>Vigamox 0.5%:</b> qid starting 1 day pre-op until 1 week post op	Day 1, Week 2, Week 8 then yearly eye examinations
	<b>Prednisolone 1.0%:</b> <ul style="list-style-type: none"> <li>• qid starting day of surgery until 1 week post op</li> <li>• bid x 2 weeks</li> </ul>	
	<b>Artificial Tears:</b> <ul style="list-style-type: none"> <li>• q1/2 hour x 3 days</li> <li>• prn afterwards</li> </ul>	
	<b>Glasses:</b> <ul style="list-style-type: none"> <li>• Should allow 4-6 weeks for capsular contraction before prescribing glasses for any residual refractive error.</li> </ul>	

\*Additional visits should be performed as deemed clinically necessary. For RLE, the post operative co-management fee includes the first 12 months of follow up, not including the yearly eye examination. For Cataract Surgery, billing is in compliance with Alberta Health Care Regulations.

# Refractive Lens Exchange and Cataract Surgery Post Operative Presentations and Activity Restrictions

The following is a summary of potential symptoms and findings associated with each surgery. For the normal findings, an expected timeline for the finding to subside is provided.

(H= hours, D= days, W=Weeks, M= Months)

Type of Surgery	Normal (Time to Subside)	Not Normal	Activity Restrictions
<b>Refractive Lens Exchange/ Cataract Surgery</b>	VA 20/15 to 20/50 (consideration should be given to other ocular conditions affecting BCVA) Foreign Body Sensation (48 H) Tearing/Photophobia (48H) Dry Eyes (up to 2M) Ghosting/Halos/Glare (2-3M) Edema at the incision site (1W) Descemet's Folds (72H) Pupil Dilation (24H) Reflections/Distortions from IOL (4W) Increase in floaters (indefinite) Mild AC reaction (1-2+ cells, 1 +flare)Change in pupil size/shape	Pus-like discharge Wound gaping/leak Unusually high pain Epithelial Defect Elevated IOP Significant anterior chamber reaction Fibrous tissue formation Hypopyon Lens is rotated (Toric) Retinal Detachment Posterior capsular opacification Macular Edema Implant not sitting "in the capsular bag" Implant displaced from central position Posterior capsular tear Implant decentration off of the visual axis (especially for multifocal implants)	<ul style="list-style-type: none"> <li>• No pets in the bed for 2 nights after surgery</li> <li>• No eye make-up for 7 days</li> <li>• No swimming, hot tub, water sports for 21 days</li> <li>• No Dusty/smoky environments for 14 days</li> <li>• No eye rubbing</li> <li>• Safety glasses during appropriate activities</li> </ul>

# Refractive Lens Exchange/Cataract Surgery Complications and Treatment

This list contains the most likely observed complications. If you have any questions please contact us.

Complication	Description	Treatment
<b>Infection</b>	Endophthalmitis is rare. Unilateral red, painful eye, anterior and/or posterior chamber reaction, blurry vision, hypopyon, white clumps in vitreous.	Contact GEC immediately for surgeon guidance as this is a potentially sight threatening condition. Hours of waiting can make a big difference.
<b>Elevated IOP</b>	Common early postoperatively, trapped viscoelastic fluid. May or may not be symptomatic.	Topical and oral medications. If IOP > 40 mm Hg consider paracentesis aqueous drainage by the surgeon.
<b>Intraocular Inflammation</b>	Significant AC reaction. Rarely fibrous strands across the pupil.	Aggressive steroidal treatment – Prednisolone 1% q1h, Atropine 1% or at least Cyclopentolate 1% , contact GEC.
<b>Corneal Haze/Decompensation</b>	Descemets folds, corneal edema, decrease in vision.	Muro 128 gtts qid, can also add Pred Forte 1.0% qid if needed, contact GEC if no improvement after 72 hours.
<b>Cystoid Macular Edema</b>	Painless decrease in vision usually after the first few weeks. Elevated macula with or without hemorrhages.	Contact GEC for further diagnosis (OCT) and treatment considerations.
<b>Posterior Subcapsular Opacification</b>	Painless decrease in vision usually after the first few weeks. Posterior capsule may have white or clear fibrotic cells, Elschnig pearls, or visually significant striations.	Non-urgent referral to GEC if visually significant. *YAG treatment preferably deferred until 3 months post op if possible to minimize risks of treatment.
<b>Retinal Detachment/Hemorrhage</b>	Painless decrease in vision associated with increase in floaters, flashes, or curtain to side of vision. May also see hemorrhages/red blood cells in the vitreous/retina.	Urgent referral to retinal specialist.
<b>Refractive Error</b>	May be associated with temporary corneal edema near the incision. May also be associated with implant rotation.	Consider etiology and treat accordingly. Consider further refractive surgery, or glasses, after 6-8 weeks.
<b>Implant Dislocation</b>	Usually a result of trauma with zonular tears if capsule and IOL are subluxated by the CCC. May subluxate months or years after surgery.	Refer to GEC for surgical treatment.

# Accelerated Collagen Cross Linking (KXL) Patient Selection

## Eligibility and Contraindications for Collagen Cross Linking

Type of Treatment	Clinical Findings	Contraindications	Comments
<b>Prophylactic</b>	<p>Minimum residual corneal bed depth after laser ablation of 325 microns</p> <p><b>Some eligible risk factors are:</b></p> <ul style="list-style-type: none"> <li>• Young age</li> <li>• Thin corneas</li> <li>• Minor topographical asymmetry</li> <li>• Against-the-rule astigmatism</li> <li>• Steep Keratometry</li> </ul>	<p>Pseudophakia if no IOL UV protection</p> <p>Aphakia</p> <p>Macular Degeneration</p> <p>Pregnancy</p> <p>Herpetic keratitis</p> <p>Rheumatoid disorders</p> <p>Known riboflavin allergy</p> <p>Patients who are diagnosed with corneal pathology and are not good candidates for refractive surgery</p>	<p>The minimum corneal thickness of 325 microns is to protect the endothelium and is an improvement over the previous technology (minimum was 400 microns)</p> <p>*Patients must discontinue vitamin C supplements for 1 week prior and 1 week after surgery</p>
<b>Therapeutic</b>	<p>Minimum starting pachymetry of 325 microns</p> <p><b>Corneal pathology such as:</b></p> <ul style="list-style-type: none"> <li>• Keratoconus</li> <li>• Pellucid Marginal</li> <li>• Degeneration</li> <li>• Iatrogenic Ectasia</li> </ul>	<p>Pseudophakia if no IOL UV protection</p> <p>Aphakics</p> <p>Macular Degeneration</p> <p>Pregnancy</p> <p>Herpetic keratitis</p> <p>Rheumatoid disorders</p> <p>Known riboflavin allergy</p>	<p>Currently not insured by Alberta Health Services</p> <p>The minimum corneal thickness of 325 microns is to protect the endothelium and is an improvement over the previous technology (minimum was 400 microns)</p> <p>*Patients must discontinue vitamin C supplements for 1 week prior and 1 week after surgery</p>

## Special Consideration in Refractive Surgery

There will always be special circumstances that may arise surrounding Refractive Surgery. Below are a few of these situations:

### Previous RK patients

Radial Keratotomy (RK) was one of the first refractive surgeries performed at Gimbel Eye Centre in the mid 1980's. A diamond knife was used to create spoke-like incisions on the cornea to flatten the overall curvature. Although quite successful considering the choices available at the time, many patients have experienced a moderate to high hyperopic drift over the years. They may also experience moderate fluctuations in refractive error throughout the day. Patients with this condition desiring refractive surgery should have multiple refractions performed, at different times of the day, to carefully evaluate the range of refractive errors. Choices of surgery may include Refractive Lens Exchange, Phakic IOLs, or PRK surgery depending on the circumstance.

### Refractive Surgery for the Unusual or High Refractive Error

Sometimes the patient's refractive error exceeds any surgical option available. In these cases, a Biotopic procedure can be considered—where multiple procedures can be combined to achieve the desired result. Usually the primary surgery will be chosen to address the majority of the prescription. For example, a +12.00-3.00 x 010 patient could consider an ICL for their hyperopia, then consider corneal refractive surgery for the remainder of the astigmatism. In these cases, the patient will likely wait 2-4 months in between the procedures to allow for stabilization, and the patient should be advised of the need of a pair of interim glasses.

### Refractive Surgery for Keratoconics

A keratoconic patient is a good example of a potentially difficult refractive error to manage, due to corneal pathology. Often it is a challenge to work within the traditional methods of optical devices due to the refractive error. Gimbel Eye Centre has successfully treated many of these patients with Phakic IOLs. More recently, **PRK with topography guided segmental ablation with therapeutic cross linking** has been introduced into the practice when the refractive error is low to moderate. Although it is recognized that the refractive procedure has not halted the underlying pathological condition after cross linking, it can bring the patient's refractive error into a more manageable range and can be used in conjunction with other optical devices. Often the overall optical quality of the vision may improve, by neutralizing the majority, if not all, of the current refractive error.

### Second Opinions

Gimbel Eye Centre welcomes requests for second opinions on patients who have had surgery at another clinic and desire an assessment of their results/concerns. We are committed to provide an honest, but diplomatic consultation and make every effort to respect the patient's needs and fears, as well as our colleague's need for respectful consideration.