An update on intraocular telescopic implants for AMD

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            Prof. Amar Agarwal.

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Financial Disclosure

Isaac Lipsitz MD is:

1) The inventor of the IMT (Implantable Miniaturized Telescope). Currently he has no financial interest in it.
2) Inventor, shareholder and CEO of OptoLight Vision Technology who is the developer of the LMI and the OriLens.
3) Prof. Agarwal has no financial interest in the content of this course.

Course Schedule

1) Intraocular telescopic implants for AMD (50 Minutes)
   A) Indication and advantages of intraocular telescopes
   B) Presentation and comparison and clinical features of the different telescopic device that are currently available.

2) The mirror telescopic implant, (LMI-B1) (30 minutes)
   A) Design and clinical results of the mirror telescopes.
   B) Surgical and postsurgical aspects of these telescopes- Prof. Agarwal.

3) Questions and answers 10 Minutes.
AMD is The Last and Lost Frontier for Cataract Surgery

AMD remains the last frontier for major developments in cataract surgery.
The 21st century will be the era of population aging
Increased number of AMD patients.
This is the future of medicine and of ophthalmology

Introduction: Implanted Telescopes

When considering intraocular implanted telescopes for AMD we have to:
- Distinguish between medical treatment and optical/visual treatment.
- 85%-90% of AMD patients have no medical treatment at all (Dry type AMD) other than vitamins.
- They can be helped only by optical means.
- Only 10-15% (wet type) can be assisted by medical treatment and become dry type.

An update on Telescopes for AMD
How Does the Telescope Work?

Notes:

Intra ocular magnification devices

True intra ocular telescopes:
1) IMT - Implantable miniaturized telescope. Visioncare Inc.
2) Ocular-Mirror telescope - Optilight Vision
3) LMI-3 Anterior chamber LMI - Optilight Vision

Double IOL Implant telescopic effect:
1) IOL-Vip - SalcoLenspecials, Italy.
2) IOL AMD - London eye hospital.

Intra ocular magnifiers:
1) Scharrerdi lens - Add +10.00
2) Lentis Mplus - Oculentes, Prof. Asdharth - Add +8.00

Implanted Optical Treatment of AMD

- A new group of patients for the anterior segment surgeon. Surgery is not difficult, but its not a small incision surgery.
- We do not cure the disease or even stop its progress, we just enable the patient to function better with the disease.
- Treatment requires a long commitment, coordinated with a retinal specialist. Patient selection process is very important and complex.
- The patients that suffer from this dreadful disease are never completely happy and satisfied.
Advantages of Intra Ocular Telescopes
(compared to external telescopes and other low vision devices)

- There is no relative movement between the eye and the telescope.
- Natural scanning of reading material and no need for head movement for scanning the image.
- Wider and more comfortable visual field.
- The mirror telescope implant can be used for any type of AMD (wet, dry, scar).
- Cosmetic and Functional.

External Telescope Visual Acuity Testing

- BCVA ETDRS testing using external telescope X2.5 mag represents the best possible vision that an eye can achieve.
- It provides only the sense of the magnification, not visual field differences.
- This is the single most important test in the inclusion criteria.
- It should be tested in each eye for near and distance vision.
- OptoLight will provide a comprehensive guide for optometric testing including the post op refraction testing.
- OptoLight developed a special computer based testing program to help standardize the pre and post op visual testing.

Telescopic implants Can Be Used for Any Type and at Any Stage of AMD

The telescopes are not intended to replace any medical treatment for AMD. They are complementary treatment to all medical or surgical treatments.

These treatments can be performed before or after the implantation of the telescopes.
Telescopes Are Not Only for AMD

- Diabetic Maculopathy
- Solar Retinitis
- Albinos
- Malignant Myopia
- Toxoplasmosis
- Stargard’s Disease
- Macular Holes

- Other Infectious Diseases
- Non-age Related Macular Degeneration
- Other Retinopathies
- Bilateral Amblyopia

AMD – current Optical Solutions

1. External Telescopes – seldom used due to narrow field of view, relative movements between the eye and the telescope and need for head scanning

2. The IMT (Implantable Miniaturized Telescope) by Dr. Isaac Lipshitz

Intraocular Implantable Systems

for optical treatment of AMD are currently being investigated

Implantable Miniaturized Telescope IMT (by Dr. Isaac Lipshitz)

Miniature Galilean Telescope inside a glass tube that is inserted in the center of a regular ICL
Telescopic Mirror Configurations
- Images are captured by a mirror that is located in the visual axis and the OrILens, projects the new image onto the retina.

Intraocular Implantable Systems
For optical treatment of AMD are currently being investigated

The IOL-VIP System
2 IOLs implanted inside an eye, one high minus in the posterior chamber and one high plus in the anterior or posterior chamber.

IOL AMD

http://iolamd.com/
Comparison Between the 3 Systems

1) Magnification:
   - IMT: 220%–280%.
   - IOL-VIP: 25%.
   - LMI: 50%.

2) Visual field:
   - IMT: Magnified center and occluded periphery.
   - IOL-VIP: All field (central and peripheral) is magnified.
   - LMI-SI: Magnified center with possibility for peripheral vision.

Comparison Between the 3 Systems

3) Monocular/binocular implant:
   - IMT: Monocular (the other eye needed for peripheral vision).
   - IOL-VIP: Binocular implant.
   - LMI-SI: Binocular implant (selected cases).

4) Patient selection criteria:
   - IMT: End stage macular degeneration, same visual acuity on both eyes, only dry type.
   - IOL-VIP: Mi AMD, deep ant. Chamber, dry and wet AMD
   - LMI-SI: Any type of AMD (dry and wet), any visual acuity (80.85 % of AMD patients)

Comparison Between the 3 Systems

5) Surgical aspects:
   - IMT: Very big 160-180 degree incision, very challenging surgery not suitable for all surgeons.
   - IOL-VIP: Foldable implants, simple surgery.
   - LMI-SI: 5.5 mm incision, almost as in a regular PMMA lens implant.

6) Endothelial damage:
   - IMT: Compromises the endothelium- issue with the FDA.
   - IOL-VIP: Very high plus lens (around = 60.00 diopeters) in Ant. Chamber, near the endothelium (still no reports on damage).
   - LMI-SI: Fully implanted inside posterior chamber- no damage to the endothelium.
## Comparison Between the 3 Systems

### 7) Post-surgical rehabilitation:

- **IMT**: Long recovery from surgery, need for extensive visual training (one eye magnified/center the other eye non-magnified/periiphery).
- **IOL-VIP**: Quick surgical recovery, need for computer visual training for locating and using the PRL.
- **LMI**: Quick recovery, no need for any post-op training.

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### 8) Post-op refraction:

- **IMT**: Operated eye – according to a formula supplied by the manufacturer, fellow eye normal refraction unchanged.
- **IOL-VIP**: Considerable to severe hyperopia induction (many patients are + 8.00 and even more). Reason for that: small distance between the lenses.
- **LMI**: SI - Post-op refraction is much lower than the pre-op, most patients are near emmetropia (post-op refraction is approximately the pre-op divided by 5.5)

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### Table:

<table>
<thead>
<tr>
<th></th>
<th>IMT</th>
<th>IOL-VIP</th>
<th>LMI</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Magnification</strong></td>
<td>220%***</td>
<td>25%**</td>
<td>240%***</td>
</tr>
<tr>
<td><strong>Visual Field</strong></td>
<td>None</td>
<td>Mlly magnified***</td>
<td>Magnified center; normal periphery***</td>
</tr>
<tr>
<td><strong>Monocular/Binocular</strong></td>
<td>Monocular</td>
<td>Binocular</td>
<td>Binocular</td>
</tr>
<tr>
<td><strong>Selection Criteria</strong></td>
<td>Difficult</td>
<td>MI only</td>
<td>All types***</td>
</tr>
<tr>
<td><strong>Surgical technique</strong></td>
<td>180° Opening</td>
<td>Normal Zhao***</td>
<td>Enlarged incision***</td>
</tr>
<tr>
<td><strong>Endothelial Damage</strong></td>
<td>Proven damage</td>
<td>Very near to endothelial***</td>
<td>No endothelial damage***</td>
</tr>
<tr>
<td><strong>Post surgical rehabilitation</strong></td>
<td>Long and difficult</td>
<td>Computer training</td>
<td>No training needed***</td>
</tr>
<tr>
<td><strong>Post-op refraction</strong></td>
<td>Formula</td>
<td>Induced hyperopia</td>
<td>Induced emmetropia***</td>
</tr>
</tbody>
</table>
Summary:

1) Intraocular optical treatment have clear advantages when compared to external devices.

2) The main differences between the 3 intraocular devices are:
   a. The amount of magnification.
   b. Visual field.
   c. Surgical technique.
   d. Patient selection criteria.
   e. Complications.
   f. Post op treatment and rehabilitation
   g. Post op refraction.

The Mirror Telescope Inside the Eye

It is designed to be fixed in the sulcus over a regular “in-the-bag” implanted IOL.

IOL-Vip

https://en.wikipedia.org/wiki/IOLVIP
Disadvantages of the IMT

- Indicated for only 4% of AMD patients
- Can be implanted in one eye only
- Loss of peripheral vision in implanted eye
- Size and weight of the implant
- Implantation and surgical technique challenges
- Long and complex patient rehabilitation process
- Manufacturing challenges
- Retinal Visibility blocked for laser treatments

Comparison of telescopes

<table>
<thead>
<tr>
<th>Device</th>
<th>Amount of Magnification</th>
<th>Visual Field</th>
<th>Positioning in the eye</th>
<th>Surgical aspects</th>
</tr>
</thead>
<tbody>
<tr>
<td>IOL-VF</td>
<td>25-30%</td>
<td>Not indicated</td>
<td>Anterior chamber implant, no posterior chamber implant</td>
<td>Regular cataract surgery with a secondary IOL implant</td>
</tr>
<tr>
<td>IOL-AOA</td>
<td>25-30%</td>
<td>Not indicated</td>
<td>2 posterior chamber implants in the bag, 1 anterior chamber implant</td>
<td>Regular cataract surgery with a secondary IOL implant</td>
</tr>
<tr>
<td>LMI-B1</td>
<td>200%</td>
<td>23°</td>
<td>Posterior chamber implant</td>
<td>6.5 mm limbal incision, Secondary to an existing IOL</td>
</tr>
</tbody>
</table>

Optical results:
Performance LMI-B1 case study and Equivalent products literature

<table>
<thead>
<tr>
<th>Performance</th>
<th>LMI-B1</th>
<th>Equivalent products literature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improvement in distance VA</td>
<td>3.4 lines</td>
<td>IOL-UHD GUVAD 2.5 IOL-VF 4.0</td>
</tr>
<tr>
<td>Improvement of near visual acuity</td>
<td>3.6 lines</td>
<td>IOL-T 2.5 GUVAD 2.0</td>
</tr>
<tr>
<td>Side effects/complications</td>
<td>No major side effects</td>
<td>Not applicable</td>
</tr>
<tr>
<td></td>
<td></td>
<td>IOL flare / cell loss</td>
</tr>
</tbody>
</table>
PMS (post market surveillance) case analysis.  
30 LMI-SI patients compared to Literature data.

<table>
<thead>
<tr>
<th>Clinical results</th>
<th>Literature data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cataract surgery</td>
<td>Case study</td>
</tr>
</tbody>
</table>
| Improvement in 5
distance VA | 3.00 | 2.00 | 2.50 | 3.00 | 2.50 | 3.00 | 2.50 |
| Improvement in near VA | 3.50 | 0.50 | 3.00 | 0.50 | 3.50 | 0.50 | 3.00 |
| Side effects     | None | None | None | None | None | None | None |
| Total Precedence | 90% | 60% | 70% | 90% | 60% | 70% | 90% |

Why Consider adopting a Telescopic implant Into Your Practice?

- Synergistic to any AMD practice.
- No need for additional equipment or investment.
- Large group of patients with no solutions.
- Retina is the trend today (anti-VGF). Aging population in western countries increase AMD prevalence.
- Surgery is relatively simple and reversible.
- Results can be predicted preoperatively.
- The Telescope is additive to any other retinal treatment.

Part 2:

Implanted mirror telescopes

1) LMI - Phakic in the bag  
2) LMI-SI - Pseudophakic- in the sulcus  
3) LMI-3 - Anterior chamber mirror telescope

Past  
Present  
Future
Why Use Reflective Optics?

- It does not depend on the index of refraction of the media.
- It can achieve high magnification in small volume.
- It can be used in combination with diffractive optics and/or refractive or even adaptive optical elements.
- It can be partly located under the iris (not in the visual axis).
- Can change other optical properties (such as contrast, visual field, color etc.) not only magnification.
- It can be manufactured from biocompatible materials

Evolution and Intra Ocular Mirrors

Bjo Protonica January 2009, Page 52;
Popular Science, April 2009 Pages 10-11.

Intraocular Implantable Systems

for optical treatment of AMD are currently being investigated

The LMI: Lineharz Macular Implant

Miniature mirrors embedded inside an IOL that creates a mirror telescopic effect in the center and leaves the peripheral vision intact.

Notes:
**Difference Between the LMI and the LMI-SI (OriLens)**

**Pseudophakic Implant**

**Phakic Implant**

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**Shape of the Pseudophakic Secondary Implant.**

It looks like a regular PMMA IOL; optical part diameter is 6.00-6.00 mm and it contains loops that have similar configuration to a regular IOL (loop diameter is 13.50 mm).

The only significant difference compared to a regular IOL is its thickness (central thickness of 1.25 mm, which is slightly higher than a normal IOL).

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**Front View Of The Pseudophakic Telescope**
One Minute Video

Telescopic Mirror Configurations

- Images are captured by a mirror that is located in the visual axis and the OriLene, projects the new image onto the retina.

Telescopic Mirror Configurations

- Miniature mirrors are embedded inside the IOL, the mirrors are configured, and accurately positioned in order to create a precise telescopic effect.

- Central light reaches the ring shape mirror first, then reflected to another mirror and finally projected towards the macular area.

- The central mirror covers only a part of the pupillary opening, peripheral light rays can pass through the non-reflective surfaces and reach the part of the retina normally.
**MTF - Optical resolution**

![Graph of MTF vs Optical Frequency]

**Clinical and Surgical Aspects**

Clinical and surgical aspects discussed by:

Prof. Amar Agarwal from Chennai, India

**LMI-3: Anterior chamber mirror telescope**

![Diagram of LMI-3 with labels]
LMI-3: Anterior chamber mirror telescope

Features:
1) Very small—only 3.20 mm in diameter, 1.20 mm thickness.
2) Kelman type loops.
3) Distance thru cornea~1.50 mm.

Advantages:
1) Does not depend on the pupil size.
2) Higher contrast—collects light from a bigger area in the Ant. Chamber.
3) Light collected in the Ant. Chamber and projected through the pupil into the post. Chamber.

Current situation:
Manufactured and ready for beginning clinical trials.

Why do we need a Pseudophakic Mirror Telescope?

70% of AMD patients are pseudophakic before their AMD progresses.

Lens exchange for a mirror telescope is not always possible.

The OriLens is the first and only intra-ocular telescopic implant for pseudophakic AMD eyes.
The Pseudophakic Mirror Telescope (OriLens)

Can also be used for phakic eyes.

(After a routine cataract surgery just prior to the implantation.)

The surgeon can select any IOL with the proper refraction that s/he desires.

Possible explantation:

If needed, it is safe and easy to remove the OriLens.

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LMI Study – clinical results

<table>
<thead>
<tr>
<th>Data</th>
<th>Distance from corneal surface (mm)</th>
<th>Distance from optic center (mm)</th>
<th>Distance from posterior capsule (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>20 00</td>
<td>20 00</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>20 00</td>
<td>20 00</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>20 00</td>
<td>20 00</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>20 00</td>
<td>20 00</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>20 00</td>
<td>20 00</td>
<td>3</td>
</tr>
<tr>
<td>6</td>
<td>20 00</td>
<td>20 00</td>
<td>3</td>
</tr>
</tbody>
</table>

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LMI Clinical results: PMS (Post Market Surveillance)

<table>
<thead>
<tr>
<th>Code</th>
<th>Distance from corneal surface (mm)</th>
<th>Distance from optic center (mm)</th>
<th>Distance from posterior capsule (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>20 00</td>
<td>20 00</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>20 00</td>
<td>20 00</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>20 00</td>
<td>20 00</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>20 00</td>
<td>20 00</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>20 00</td>
<td>20 00</td>
<td>3</td>
</tr>
<tr>
<td>6</td>
<td>20 00</td>
<td>20 00</td>
<td>3</td>
</tr>
</tbody>
</table>
Table below shows the performance data that was generated from post mortem surveillance. The data was gathered with the help of local optometrists and ophtalmologists in various countries.

<table>
<thead>
<tr>
<th>Location</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
<th>Male</th>
<th>Female</th>
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<tbody>
<tr>
<td>UK</td>
<td>300</td>
<td>200</td>
<td>500</td>
<td>1200</td>
<td>800</td>
<td>2000</td>
<td>1800</td>
<td>1600</td>
<td>3400</td>
<td>2400</td>
<td>5800</td>
<td></td>
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<tr>
<td>India</td>
<td>200</td>
<td>100</td>
<td>300</td>
<td>900</td>
<td>500</td>
<td>1400</td>
<td>1000</td>
<td>600</td>
<td>1600</td>
<td>1100</td>
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<td>150</td>
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<td>France</td>
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<td>190</td>
<td>570</td>
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<td>900</td>
<td>500</td>
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<td>800</td>
<td>500</td>
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<td>950</td>
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<tr>
<td>Italy</td>
<td>120</td>
<td>70</td>
<td>190</td>
<td>570</td>
<td>330</td>
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<td>500</td>
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<td>800</td>
<td>500</td>
<td>1300</td>
<td></td>
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<tr>
<td>New Zealand</td>
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<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Norway</td>
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<td>100</td>
<td>300</td>
<td>900</td>
<td>500</td>
<td>1400</td>
<td>1000</td>
<td>600</td>
<td>1600</td>
<td>1100</td>
<td>2700</td>
<td></td>
</tr>
</tbody>
</table>

Performance analysis shows a gain of 18 letters (over 3.5 lines) on ETDRS chart for near and a little more than 9 letters (almost 2 lines) on ETDRS chart for distance.

## LMI-SI: Side effects

<table>
<thead>
<tr>
<th>Side-effects</th>
<th>Number of eyes</th>
<th>Treatment</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dipyridamol</td>
<td>6</td>
<td>2 eyes: stop 1 eye: local injection</td>
<td>Eyes helped, gradually by local injection and treatment</td>
</tr>
<tr>
<td>Tadalafil</td>
<td>2 eyes</td>
<td>No treatment</td>
<td>Self-adapted by 2 times</td>
</tr>
<tr>
<td>Bevacizumab</td>
<td>5 eyes</td>
<td>No treatment</td>
<td>Self-adapted</td>
</tr>
<tr>
<td>Steroid injection</td>
<td>1 eye</td>
<td>2 times</td>
<td>Most helpful for 1 week treatment then reduced to every 2 weeks</td>
</tr>
<tr>
<td>Arterial retinal oedema</td>
<td>1 eye</td>
<td>2 times</td>
<td>Some patient needed arterial retinal oedema treatment</td>
</tr>
</tbody>
</table>

## LMI-SI: Surgical problems

<table>
<thead>
<tr>
<th>Surgical abnormality</th>
<th>Number of eyes</th>
<th>Treatment</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vision loss (Cataract, Lenses implant)</td>
<td>2 eyes</td>
<td>1 eye</td>
<td>Mini-extensive corneal surgery and phakic intraocular lens</td>
</tr>
<tr>
<td>Lens not well positioned</td>
<td>4 eyes</td>
<td>1 eye</td>
<td>Re-operation</td>
</tr>
<tr>
<td>Lens dislocation</td>
<td>3 eyes</td>
<td>No treatment</td>
<td>Patient is happy as is</td>
</tr>
<tr>
<td>Lense implant squeal tions</td>
<td>1 eye</td>
<td>1 eye</td>
<td>Surgery</td>
</tr>
<tr>
<td>Right retinal detachment</td>
<td>1 eye</td>
<td>No treatment</td>
<td>Failed lens</td>
</tr>
<tr>
<td>Eye damage during surgery</td>
<td>1 eye</td>
<td>No treatment</td>
<td>Distorted pupil, partial IOL</td>
</tr>
</tbody>
</table>
The Intra Ocular Mirror Telescope

- Can help approximately 80% of AMD patients.
- Uses reflective optics technology.
- Simple, safe and can be done by any cataract surgeon.
- Preserves at least part of the peripheral vision.
- Quick recovery.
- No damage to the corneal endothelium.
- Complementary to all other retinal treatments.
- Can be used for other retinal diseases.

Interim Summary

- Intra ocular reflective telescopic technology has multiple advantages in AMD treatment.
- Can be used for other retinal diseases.
- Can preserve at least part of the peripheral vision.
- Easy to implant.
- Good optical resolution.
- Can be used for all AMD types (Dry or Wet type).
- Helps for near and for distance.

Patient Selection Criteria

- Bilateral AMD or other macular diseases.
- Type – dry type, wet type, scar stage or other similar lesions.
- Visual acuity ranges between 20/60 to 20/800 in each eye.
- Visual acuity improved for distance and/or near when tested with a X2.5 magnification external telescope.
- Motivated, knows the risks and potential benefits and is highly motivated to read and improve visual capabilities.
Pupil Size

<2.50 mm – not enough of the magnified image. The telescope will not work.

= 2.50 mm – good magnified central image. No peripheral image.

>2.50 mm up to 4.50 mm – good peripheral and good magnified central image.

Post op control pupil size for optimal performance.

Bi-lateral implantation may be possible if adequate peripheral vision exists.

YAG Laser Treatments

The mirror telescopes are not compatible with YAG laser treatment!

Important Clinical Aspects

- It's a new concept (limited knowledge on long-term complications and side effects)
- Not recommended for every patient. (A thorough examination is needed before confirming that the implant will help a specific patient)
- The results are not guaranteed and may change over time.
- The implantation does not cure the AMD; (it helps optically)
- The implantation does not stop deterioration or progresses.
- The post-op best visual acuity can be estimated by the external telescope testing (but cannot guarantee that this level of vision will be achieved in every case)
## Important Clinical Aspects

- The level of expectations of the results should be realistic.
- **Every AMD patient is unique** (this is not regular cataract surgery) (The results of the surgery depends on the pre-op examination)
- Any change in patient selection/exclusion criteria should be discussed with OptoLight on a specific patient basis.
- The effect of the OrILens on the peripheral vision depends on the pupil diameter and may differ in every patient.
- An imbalance between both eyes may occur (will require medical attention until second eye implantation.)
Surgical Guide and Pearls

Anesthesia: according to the surgeon’s preference.

Incision: corneal or limbal, according to surgeon’s preference.

Size of Incision: 5.5 - 6.0 mm.

If the eye is phakic, a routine phaco or ECCE procedure.

Peripheral iridectomy should be done pre op or surgically (YAG laser should not be used after surgery).

Visco-elastic on the entire implant and fill the anterior chamber before insertion of the OriLens.

Grasp the OriLens by the loops or the base of the loop; do not touch the lens optic with forceps!!!
Surgical Guide and Pearls – Cont’

Insertion of Orlens (the posterior mirror, ring shaped, should point towards you).
Place both loops “in-the-sulcus”.
Remove all the Visco-elastic.
Eye closure (suturing) according to surgeon’s preference.
Sub-conjunctival injection of steroids and antibiotics.
Pre-op and immediate post-op medications as in a regular cataract.

Complications

- Positioning of the mirrors (avoid decentered mirrors).
- Relations between the central mirror and the pupil.
- Post-op inflammation.
- Synechia.
- Lens inserted upside down (inverted).
- Epithelial edema
- Explantation of implant.
Notes:

OptoLight’s Vision Testing Program

- The OVT program is used for patient selection purposes.
  1) Testing before implantation (for patient selection process).
  2) Testing pre op in low contrast.
  3) Testing after implantation (follow up).
- A manual is supplied together with the software
- The software can be installed and used on any PC.
- Data handling and storing is performed automatically.

Future Development of the Intra Ocular Mirror Technology

- LMI-3 Anterior chamber telescope.
- Telescope with larger magnification X4 (advanced design stage).
- Mirror telescope for Albinotic eyes. (Lower magnification)
- Telescope on demand
Comparison Between VOF Injections and Mirror Teleoscopic Implant

<table>
<thead>
<tr>
<th></th>
<th>VOF Injections</th>
<th>Mirror teleoscope</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potential candidates for treatment</td>
<td>Only eyes with VOF (10-15% of AIDS cases)</td>
<td>Any type of AIDS case</td>
</tr>
<tr>
<td>Number of treatments</td>
<td>Multiple injections for years</td>
<td>One surgical procedure</td>
</tr>
<tr>
<td>Stability of visual effect</td>
<td>Decrease over time, needs enhancements</td>
<td>Magnifying effect is stable</td>
</tr>
<tr>
<td>Costs</td>
<td>High (depends on medication used and doctors fees)</td>
<td>5000 Euro for the implant plus one-time doctors fee</td>
</tr>
<tr>
<td>Predicting the results</td>
<td>Can be known before treatment</td>
<td>Can be tested in advance</td>
</tr>
<tr>
<td>Gain/Loss of lines</td>
<td>Depends on patient compliance between 5 to 15 letters</td>
<td>Only 15 letters gain is achievable for implantation</td>
</tr>
<tr>
<td>Additive effect between treatments</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Reversibility</td>
<td>Not reversible</td>
<td>Reversible, can be removed</td>
</tr>
<tr>
<td>Side effects and complications</td>
<td>Relatively low but may be vision threatening</td>
<td>Similar to cataract surgery</td>
</tr>
<tr>
<td>Regulatory status</td>
<td>CE and FDA approved</td>
<td>Only CE approved</td>
</tr>
</tbody>
</table>

New Concepts in Ophthalmic Practice

1. Implanting reflecting surfaces (mirror optics) inside a human eye.
2. The concept of blocking an entering image from reaching the macula (capturing it, modifying it and then projecting the modified image onto the retina).
3. The concept of creating 2 different optical systems in one IOL.
4. Creating a new type of visual field, (magnifying only the center while preserving some normal peripheral field).
5. The concept of creating an intraocular image projector for changing the retinal image (visual field, color, magnification, contrast) according to the specific patient's need.
6. Developed the first “Nano metric IOL” - It requires accuracies of 100 Nanometer in order to achieve good optical performance.

Questions?
Comments?