Quality counts when referring patients to hospitals and physicians, so Cleveland Clinic has created a series of outcomes books similar to this one for its institutes and departments. Designed for a health care provider audience, the outcomes books contain a summary of our surgical and medical trends and approaches; data on patient volume and outcomes; and a review of new technologies and innovations. We hope you find these data valuable. To view all our outcomes books, visit Cleveland Clinic’s Quality Web site at clevelandclinic.org/quality/outcomes.
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The faculty and staff of the Cole Eye Institute are excited to present their 2006 clinical outcomes summary. We have made a significant investment of departmental resources and time to generate the data that follow. Patients routinely rate vision, particularly avoidance of blindness, critical to their quality-of-life assessments and their ability to remain independent. Most eye departments and practices base their “outcomes” on billing and hospital database information. Although these figures are important, what matters to patients is “seeing” – being 20/40 or better and being able to read, work and drive. Most outcome data in ophthalmology have not been focused on vision for good reasons. In routine practice, vision is not measured in a reproducible manner – “protocol refractions” are time-consuming to conduct. Snellen acuity charts are ubiquitous, but they are not helpful in measuring changes in vision in a reliable and reproducible manner. Loss of a line on a Snellen chart from 20/20 to 20/25 is a minor change; loss from 20/100 to 20/200 represents a doubling of the visual angle. Use of so-called “logMAR” charts are needed.

I want to highlight the following points as you explore our data:

1. We have gone to great lengths to assess visual acuity in the most accurate way possible. For specialties where change in visual acuity is a primary outcome measure, we are using protocol refractions before and after surgery with logMAR visual acuity charts. We schedule specific appointments before and after surgery for these assessments, which are performed by certified and specially trained visual acuity examiners.

2. Please note that we have reported follow-up results for only a partial year, which explains why the follow-up numbers are not as high as our total volume of patients. Next year, we will present complete annual results. For most surgeries, one-year vision results are a key endpoint. Since it takes to the end of the following year to get data on each patient who has had surgery the previous year, our 2007 booklet will be the first to show full year results as a large and robust cohort.
3. We are providing outcomes data on the full spectrum of ophthalmic surgery. Most of the surgical procedures performed at the Cole Eye Institute are tracked and reported. Our faculty also performs surgery at other Cleveland Clinic ambulatory surgical centers. This report does not include patients who were not operated on at the Cole Eye Institute.

4. As a regional, national and international referral center, many of our patients are followed by their local ophthalmologists. Thus, this report does not include patients who are not followed at the Cole Eye Institute.

5. The complexity of many of the surgical cases performed by our staff is very high. As a result, “historical controls” from publications do not offer a reliable benchmark for our performance. For example, routine primary retinal detachment patients typically are treated urgently near their home. Second, third and fourth reoperation patients are more likely to travel for care.

We are breaking ground with the scope of our outcomes project, and in spite of the complexity of cases and lack of a clear benchmark, our outcomes are excellent. Our physicians strive to push the boundaries of science and technology so we can provide excellence for our patients. We hope that by reviewing and analyzing information, we will continue to improve and offer patients better outcomes.

I congratulate Scott Smith, M.D., M.P.H., who has led this work on behalf of our clinical faculty, and all Cole Eye Institute employees for their effort and accomplishments to collect and analyze the data that appear on the following pages. Thank you for reviewing it.

Hilel Lewis, M.D.
Chairman, Division of Ophthalmology
Director, Cole Eye Institute
### Department Overview

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Clinic Visits</td>
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<tr>
<td>Total Surgical Procedures</td>
<td>7,642</td>
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<tr>
<td>Total Surgeries</td>
<td>4,777</td>
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<tr>
<td>Total Cataract Procedures</td>
<td>2,440</td>
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<tr>
<td>Total Cornea Procedures</td>
<td>262</td>
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<tr>
<td>Total Glaucoma Procedures</td>
<td>342</td>
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<tr>
<td>Total Retina Procedures</td>
<td>2,858</td>
</tr>
<tr>
<td>Total Oncology Procedures</td>
<td>982</td>
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<tr>
<td>Total Oculoplastics Procedures</td>
<td>1,422</td>
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<tr>
<td>Total Strabismus Procedures</td>
<td>463</td>
</tr>
<tr>
<td>Total Refractive Procedures</td>
<td>1,606</td>
</tr>
<tr>
<td>Total Laser Procedures</td>
<td>1,468</td>
</tr>
<tr>
<td>Total Intraocular Drug Therapies</td>
<td>1,613</td>
</tr>
</tbody>
</table>

Cleveland Clinic Cole Eye Institute is here to serve the needs of patients and referring physicians by providing timely, accurate diagnoses and best-of-class therapeutic care ranging from surgical intervention to pharmaceutical management and state-of-the-art laser treatments.

At the Cole Eye Institute, research and patient care are integrated. The belief that the two are interdependent and synergistic is the foundation for everything we do. We believe this approach enhances diagnosis and advances treatment, to the benefit of our patients today and tomorrow. Our Institute provides 150,000 patient visits per year, ranking us among the top institutions for clinical activity. Surgical volume
exceeds 5,000 cases per year. The Institute offers one of the largest hospital-based continuing medical education programs in the United States. Our residency and fellowship programs are highly competitive and draw many applicants each year.

Treatment for the full range of vision disorders and conditions, as well as eye care for all ages, is offered. An internationally recognized staff of 27 ophthalmologists is composed almost entirely of subspecialists, and eight optometrists round out our comprehensive services. Our state-of-the-art building and technology demonstrates our dedication to patients and to the tradition established by the founders of Cleveland Clinic – a commitment to world-class care that always puts the patient first and provides further education for those who serve.

Our facilities are designed for maximum patient comfort, service and quality. Same-site comprehensive eye care is provided with diagnostic services suites located just a quick elevator ride from the clinical suites. State-of-the-art operating rooms are also on the premises. All windows in the patient areas feature special light filters to minimize the discomfort of eyes that are dilated or newly treated. Waiting rooms are designed to be comfortable and include a special area for children to play. An optical retailer is on site for patient convenience. Amenities include valet parking and an easy drive-up area for pick-up of postoperative patients.

Our regional eye care program provides services in five suburban locations throughout the Greater Cleveland area, including one ambulatory surgery center. Through clinical trials, we are pioneering treatment protocols for complex vision-threatening disorders, including age-related macular degeneration and glaucoma. Our aggressive research program integrates basic science, clinical research and patient care.
Other Unique Programs at Cole Eye Institute

The Center for Genetic Eye Diseases provides clinical diagnostic and therapeutic services for patients with inherited eye conditions such as corneal and retinal dystrophies and microphthalmia. Patients with inherited disorders that involve the eye (neurofibromatosis, albinism, neurodegenerative disorders and Marfan syndrome) are referred to the Center by physicians from around the country. A monthly specialty clinic is dedicated to patients with retinal dystrophies and their families.

The Foundation Fighting Blindness’ Center, a central collection agency for eyes donated by individuals across the United States for blindness research, shares tissue samples with researchers worldwide. Formally known as the Retinal Degeneration Pathophysiology Facility, the collection center accepts eye donations after death from any person of any age who has normal vision or any degree of vision loss resulting from a retinal-degenerative disease. Cole Eye Institute staff members prepare a detailed medical report about each donated eye to help researchers track the effects of eye disease in different types of people and environments.
The Cole Eye Institute's carefully created light-filled design brings patients every efficiency and world-class eye care in an environment filled with light and pleasant vistas. Improved patient flow, a convenient, patient-friendly floor plan and spacious waiting areas complement the building's high technology, 21st century equipment.

Behind the scenes, the Cole Eye Institute conference areas are completely wired for instantaneous electronic video and audio linkups with sites worldwide. These capabilities allow Cole Eye Institute ophthalmologists to serve as guest lecturers at leading institutions and meetings around the world without leaving Cleveland and to broadcast live ophthalmic surgery as a teaching tool for physicians and medical students. They also bring the expertise of internationally recognized specialists to the Cole Eye Institute for continuing education for our physicians.

First Floor

The Diagnostic Suite

Twelve exam rooms, each supplied with special camera equipment technology and ultrasound equipment, make up the Diagnostic Suite. The Suite is strategically located one floor below the Patient Modules to directly support the exam areas and facilitate immediate patient access. The electrophysiology suite is a state of the art department that houses the scientist and technician whose missions are to investigate retinal cell function through specific measurements of electrical activity in the retina.
The Experimental Surgery Suite

This state-of-the-art facility enables researchers and clinicians to develop new surgical techniques and instrumentation equipment. With complete tools and equipment of an operating room, the Experimental Surgery Suite is one of the few in the country with full operating capacity.

The Paul and Carol David Ophthalmic Surgery Pavilion

The state-of-the-art surgery pavilion includes five operating rooms, each with audiovisual technology that is connected to the Institute’s Education Auditorium so practicing and visiting ophthalmologists, residents, fellows, students and staff can watch activity in the operating room and through the microscope. Two operating rooms have viewing areas for visiting physicians and family members. The recovery area and special discharge area facilitate ease of flow for the patient and medical staff.

The Education Pavilion

Training future eye specialists is greatly enhanced in the Education Pavilion with the James P. Storer Teleconference Center designed with tele-video technology. The Library includes a video room for viewing training videos as well as a study room and assigned carrels for residents. In addition, there is a conference room for residents.
Second Floor

The Refractive Surgery Suite

One of the most innovative features of the Cole Eye Institute, the Refractive Surgery Suite is used to perform cutting-edge procedures to restore vision. Patient rooms, diagnostic suites and laser operating rooms help meet the growing demand for these services.

The Clinical Research Suite

The Clinical Research Suite provides space for coordination for all clinical research studies for the Division of Ophthalmology and the Cole Eye Institute.

The Low Vision Clinic

The Low Vision Clinic provides customized treatment to patients and education for families in the use of visual aid devices. For many people with diseases like macular degeneration, the Low Vision Clinic is a unique facility with the resources these patients need to improve their quality of life.
The Patient Clinic

Designed to maximize physician/patient effectiveness and to enhance patient satisfaction, exam rooms are clustered by specialty into nine patient modules and share a central check-in/check-out and waiting area. The Pediatric Suite, designed specifically for young patients, includes six exam lanes and its own waiting area. The Patient Clinic is supported by the Diagnostic Suite located directly below it on the first floor.

The Main Lobby is seen from the area near the 2nd floor elevators.
Third Floor

The Research Suite
Housed on the third floor of the Eye Institute, this state-of-the-art facility is used by basic researchers and clinician scientists dedicated to investigating new ways to prevent blindness and restore vision. The location of this research pavilion—adjacent to the clinician’s administrative offices—provides for the cross-fertilization of ideas between clinicians and scientists. It contains numerous lab modules, an electromicroscopy lab, and the research conference room.

Physicians’ Administrative Suite
Located on the third floor next to the Research Suite, these offices support the work of clinicians and scientists.

Patients arriving for appointments check in at the second floor desk, accessible directly off the skyway or via the stairs or elevator from the Main Lobby.
Quality & Outcome Measures | Cataract Surgery

Cataract surgery is the most commonly performed ophthalmic surgical procedure worldwide and, thus, represents a large proportion of our surgical volume. From January through September 2006, 699 cataract extraction surgeries were performed. Many cataract extractions were performed as combined procedures in conjunction with glaucoma, cornea or retinal surgery. The results of combined procedures are included with the outcomes of the other operation. In this section, the results of cataract surgery performed as a single operation are described.

![Pie chart showing 83% Cataract Surgery Only and 17% Combined Cataract and Other Surgery](chart.png)

N = 699
Intraoperative complications were rare during cataract surgery, occurring in only 2% of cases. The most common complication was related to the integrity of the lens capsule, either due to posterior capsule tear or zonular dialysis, with or without vitreous prolapse into the anterior segment.

Postoperative complications were also uncommon, occurring in <3% of patients. The most common complication observed was cystoid macular edema (CME), which occurred in 2.6% of patients. The reoperation rate was 0.8%. The causes for reoperations were dislocated intraocular lens, retained lens fragments, choroidal hemorrhage and retinal detachment.
The goal of cataract surgery is improvement of visual acuity. In patients with ocular co-morbidity, improvement in visual acuity may be limited in spite of cataract surgery. At the Cole Eye Institute, the level of ocular pathology tends to be higher than in many other settings; therefore, a large proportion of patients have limited visual potential following cataract extraction. In spite of this high level of ocular pathology, improvement in visual acuity at the 1-month follow-up examination was observed in patients with and without other ocular disease. Patients with a history of corneal disease, uveitis, glaucoma, retinal conditions or other ocular co-morbidity all experienced visual improvement of similar magnitude to that seen in patients with otherwise healthy eyes. The final visual outcome was, of course, better in patients without other ocular disease, where the mean ETDRS visual acuity score was 77.9, corresponding to nearly 20/20 vision. Long-term visual outcomes with 1-year follow-up will be reported in the future when the data become available.

The great majority of patients achieved a refractive outcome near that anticipated. In spite of the substantial number of patients with ocular co-morbidity which can influence the postoperative refractive outcome, 90.3% of patients achieved a final spherical equivalent refractive error within 1 diopter of the expected result based upon ocular biometry.
Cornea Surgery

Corneal transplant surgeons at the Cole Eye Institute perform state-of-the-art transplants for numerous conditions that distort or cloud this normally transparent tissue. Traditional full thickness procedures, also known as penetrating keratoplasties (PK), make up the bulk of the grafts performed over the past year. Of 88 grafts, all have remained clear at 12 months.

Corneal transplant specialists have also embarked on cutting-edge lamellar corneal transplant procedures in which only the portion of the cornea that is diseased is replaced. Surgeons may now selectively transplant the endothelium for conditions such as pseudophakic bullous keratopathy and Fuchs’ endothelial dystrophy. One variation of this procedure is known as posterior lamellar endothelial keratoplasty (PLEK) or as descemet’s stripping automated endothelial keratoplasty (DSAEK). Cleveland Clinic surgeons were among the first in the nation to offer this transplant technique. Over the past year, 13 procedures were performed. Recipients are provided faster visual recovery and more stable and predictable refractive outcomes than with traditional penetrating keratoplasty.

Corneal surgeons are also transplanting just the anterior portion of the cornea for conditions such as keratoconus and corneal scarring. This procedure, anterior lamellar keratoplasty, affords the advantage of allowing the patients to retain their own healthy endothelium, which avoids the risk of endothelial rejection and other potential complications of penetrating keratoplasty. Over the past year, 22 of these grafts were performed.
For some patients with keratoconus, corneal surgeons offer an alternative to corneal transplantation that can restore a normal corneal curvature to allow vision to be corrected with glasses or contact lenses. This procedure, known as Intacs implantation, entails placing small plastic arcs in the stroma of the cornea to change its curvature. Over the past year, 13 Intacs surgeries were performed on patients with keratoconus.

![Distribution of Anterior Segment Surgeries](image)

Many serious sight-threatening disorders may affect only the surface of the eye, including the cornea. These conditions may disrupt or destroy the corneal stem cells responsible for producing a healthy cellular surface to the eye. Cleveland Clinic surgeons have performed a number of stem cell transplants to restore the ocular surface. In addition, they have created a device that facilitates harvesting the tissue from cadaveric donor tissue.

For patients with serious disorders who are not a candidate for the more common types of corneal transplantation, the cornea may be replaced with an artificial cornea, called a keratoprosthesis. This plastic device was implanted in two patients at the Cole Eye Institute in the past year.

A total of 133 corneal surgeries were performed in 2006. The majority of patients had successful corneal surgery with no complications. No intraoperative complications occurred, and the postoperative complication rate was 3%. The majority of postoperative complications were due to graft rejection and glaucoma progression. The reoperation rate following corneal surgery was 2.2%. Causes for reoperation included wound leak, failed graft and infection.
Analysis of intraoperative complications included all surgical procedures performed during the year. Postoperative complications and outcomes of surgery included those patients who had completed ≥3 months of follow-up. Consequently, the sample sizes reported for intraoperative and postoperative complications differ.

Maximum visual rehabilitation is not expected following most keratoplasty procedures for 1 year following surgery. However, we have found that for those patients who have completed 6 months follow-up, the mean improvement in ETDRS visual acuity score was 27.9, corresponding to an improvement of over 5 lines of visual acuity. Longer term results will be presented as the data become available.
Glaucoma Surgery

During 2006, 269 glaucoma surgeries were performed. Of these, 90 have at least 3 months of follow-up data available. Types and numbers of glaucoma procedures are listed below. Although primary glaucoma surgical procedures are often performed at the Cole Eye Institute, many of our patients have more complex conditions and require other procedures performed simultaneously with their glaucoma surgery. These include cataract extraction, pars plana vitrectomy and/or corneal transplantation. Simultaneous surgeries were performed in 43.2% of patients undergoing glaucoma surgery. The reoperation rate was 1.1%. The causes for reoperation included flat anterior chamber, exposure of glaucoma valve and uncontrolled intraocular pressure.

<table>
<thead>
<tr>
<th>Surgery Type</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trabeculectomy</td>
<td>54</td>
<td>60.0%</td>
</tr>
<tr>
<td>Glaucoma implant</td>
<td>26</td>
<td>28.9%</td>
</tr>
<tr>
<td>Revision of glaucoma implant</td>
<td>1</td>
<td>1.1%</td>
</tr>
<tr>
<td>Revision of trabeculectomy</td>
<td>7</td>
<td>7.8%</td>
</tr>
<tr>
<td>Other</td>
<td>2</td>
<td>2.2%</td>
</tr>
<tr>
<td>Total</td>
<td>90</td>
<td>100%</td>
</tr>
</tbody>
</table>
The two principal glaucoma surgical procedures are trabeculectomy and implantation of a glaucoma valve. The goal of these procedures is reduction of intraocular pressure (IOP) to prevent progressive glaucomatous optic nerve damage. Significant reduction in IOP was accomplished following surgery with each procedure, as assessed at the 3-month postoperative time point (both p<0.0001). A reduction in IOP of at least 20% was accomplished in 80.8% of patients undergoing implantation of a glaucoma valve and in 59.3% of patients undergoing trabeculectomy. In patients undergoing simple trabeculectomy not combined with additional surgical procedures, 82.6% experienced a reduction in IOP of at least 20%. Longer-term follow-up data are required to determine the overall success rates of these procedures, since further reduction in IOP is often accomplished by adjustment of supplemental glaucoma medications during the 6-to-12-month postoperative time period.

Since the goal of glaucoma surgery is to reduce IOP, improvement in visual acuity is not anticipated. At the 3-month postoperative time point, 76% of patients undergoing a glaucoma implant and 90.9% of patients undergoing trabeculectomy had visual acuity that was stable in comparison to baseline values. Stability of vision was defined by a decrease in ETDRS visual acuity score of no greater than 10, corresponding to two lines on the visual acuity chart.

Surgical complications were uncommon. Intraoperative complications occurred in only 1.9% of cases.
Analysis of intraoperative complications included all surgical procedures performed during the year. Postoperative complications and outcomes of surgery included those patients who had completed ≥3 months of follow-up. Consequently, the sample sizes reported for intraoperative and postoperative complications differ. Postoperative complications were similarly rare, also occurring in only 1.9% of cases. The low rate of surgical complications is also notable, given the high degree of complexity of many patients referred for tertiary care and the high proportion of combined surgical procedures performed.
**Oculoplastic Surgery**

The oculoplastic service is comprised of three categories: eyelid surgery, lacrimal surgery and orbital surgery. There were 376 oculoplastic surgeries performed in 2006. Eyelid surgeries account for almost three-fourths of all oculoplastic surgeries performed in 2006.

Analysis of intraoperative complications included all surgical procedures performed during the year. Postoperative complications and outcomes of surgery included those patients who had completed ≥3 months of follow-up. Consequently, the sample sizes reported for intraoperative and postoperative complications differ.

Intraoperative complications were very rare for eyelid surgeries. The complication rate for eyelid surgeries was 0.4%. There were no intraoperative complications for lacrimal or orbital procedures.
Reoperation rates for eyelid, lacrimal and orbital surgeries were: 1.7%, 3.2% and 0%, respectively. The causes for reoperation were eyelid asymmetry or dysfunction, and continued epiphora.

Postoperative eyelid symmetry showed excellent results in 88% of cases and good results in the remaining 12%. Excellent and good eyelid symmetry were defined by a marginal reflex distance (MRD) within 0.5 mm and 1.0 mm of the desired position, respectively.
Postoperative Eyelid Symmetry

Excellent 87.8%
Good 12.2%

Excellent and good eyelid symmetry were defined by a marginal reflex distance (MRD) within 0.5 mm and 1.0 mm of the desired position, respectively.

Oncologic Eye Procedures

Melanoma is a primary tumor of the skin or eye. In the eye, it arises from the pigmented cells of the uvea (choroid, ciliary body or iris). Uveal melanoma of the eye occurs in 4.3 people per million population per year. It almost always occurs in one eye and is more common in fair skinned, blue eyed people. In the past, enucleation was the only treatment for uveal melanoma. In recent years, new methods of treatment have been developed which may be used to save the eye. We have increasingly used radioactive plaque for the treatment of uveal melanoma. From January to June 2006, 18 patients with uveal melanoma were treated; the majority (66%) required plaque radiotherapy.
Radioactive plagues containing iodine-125 and ruthenium-106 are used on a regular basis. If the tumor is < 5 mm in height, then a ruthenium-106 plaque is preferred. The size of the plaque is determined by the diameter of the tumor.

Over the short-term, tumor regression with preservation of vision has been observed in 89% of cases. The median postoperative vision for patients with radioactive plagues was 20/80. None of the patients died from metastasis during the mean follow-up period of 9.3 months (range of follow-up: 1-23 months).

Figures 1 A and B: Fundus photograph showing a dome-shaped pigmented choroidal melanoma with indistinct margins in the inferior quadrant OS (A). Six months later, the tumor showed evidence of regression and complete resolution of exudative retinal detachment without any radiation complications (B).

**Refractive Surgery**

Outcomes of laser vision correction are best summarized based on the patient’s preoperative refractive status. Both the type and magnitude of refractive error (nearsightedness, farsightedness, or astigmatism) affect the likelihood that uncorrected visual acuity of 20/20 or better will be achieved. Another important outcome that indicates the outcome of laser vision correction is the proportion of patients whose final refractive error falls within ±0.5 diopters of the intended result.
Below, we present the collective outcomes for laser in-situ keratomileusis (LASIK) and photorefractive keratectomy (PRK), using custom or conventional ablation, and using a mechanical microkeratome of femtosecond laser IntraLASIK. In addition to the two outcomes described above, we also report the proportion of patients with an exceptional outcome (uncorrected acuity of 20/15 or better), and the proportion of patients with uncorrected acuity meeting the requirements for driving without glasses (20/40 or better). For the time period of April 2005 through March 2006, 386 eyes were included in this analysis.

**Low Myopia**
(0 to 3 Diopters Sphere, ≤ 0.5D Cylinder)

**Moderate Myopia**
(3 to 6 Diopters Sphere, ≤ 0.5D Cylinder)
Low Myopic Astigmatism
(0 to 3 Diopters Sphere, ≥ 0.75D Cylinder)

Moderate Myopic Astigmatism
(3 to 6 Diopters Sphere, ≥ 0.75D Cylinder)

Hyperopia
(0 to 6 Diopters Sphere, All Eyes)
In summary, in myopic eyes, 90% achieved uncorrected visual acuity of 20/20 or better and had a refractive result that fell within ±0.5 D of the desired target. 100% achieved uncorrected visual acuity of 20/40 or better and 50% had an exceptional result of uncorrected visual acuity of 20/15 or better. In hyperopic eyes, where a precise refractive outcome is known to be more difficult to achieve following laser vision correction, 60% of our patients still achieved uncorrected visual acuity of at least 20/20 and 85% had a refractive outcome within ±0.5 D of the target outcome. 100% had uncorrected visual acuity of 20/40 or better and 15% achieved an exceptional result with uncorrected visual acuity of at least 20/15.

**Vitreoretinal Surgery**

Vitreoretinal surgery requires precise surgical skill, state-of-the-art technical equipment and a dedicated surgical team. Retinal surgeons at the Cole Eye Institute are pioneers in many surgical procedures, including proliferative vitreoretinopathy, complicated retinal detachments, diabetic vitrectomy, macular translocation, submacular surgery and microincision surgery. In 2006, 610 surgeries were performed. Outcomes data were available for 536 cases. Emergency cases or situations where protocol visual acuity was not performed (patient previously dilated, etc) or the patient received postoperative care at another location or institution were excluded from the analysis.

**Indication for Vitreoretinal Surgery**

- Diabetic Traction RD 113
- Rhegmatogenous RD 112
- Macular Pucker 40
- Other 210
- Proliferative Vitreoretinopathy 32
- Macular Hole 29
- N = 536
The Cole Eye Institute is a tertiary care facility. Difficult cases are often referred to our vitreoretinal department. Of 536 cases, 489 (91%) were primary surgeries and 47 (9%) were reoperations. A wide variety of surgeries were performed here: 395 (74%) were pars plana vitrectomies; 51 (10%) were combined pars plana vitrectomy and scleral buckle; 56 (11%) were scleral buckle alone; and 14 (3%) were pars plana vitrectomy combined with pars plana lensectomy. In addition, rarer surgeries were performed such as scleral buckle removal, drainage of choroidal hemorrhage or removal of intraocular foreign body.
Analysis of intraoperative complications included all surgical procedures performed during the year. Postoperative complications and outcomes of surgery included those patients who had completed ≥3 months of follow-up. Consequently, the sample sizes reported for intraoperative and postoperative complications differ.

Intraoperative complications during vitreoretinal surgery occurred in 46 (9%) cases. It is important to note these complications were not mutually exclusive, meaning more than one complication could occur in a patient. The most common complication was an iatrogenic retinal tear 33 (6%). When recognized intraoperatively, this complication was easily managed. Hemorrhage was rare. Vitreous hemorrhage occurred in 1% of cases, choroidal hemorrhage in 0.5% of cases and anterior segment hemorrhage/hyphema in 0.2% of cases.

Postoperative complications were equally rare and occurred in only 7 (3.9%) of 178 patients seen for a 3-month follow-up visit. Complications included retinal detachment (RD) 1.7%, proliferative vitreoretinopathy (PVR) 1.1%, vitreous hemorrhage 0.6%, glaucoma 0.6%, astigmatism 0.6%, optic atrophy 0.6% and anterior hyaloidal fibrovascular proliferation (AHFVP) 0.6%. There were no cases of endophthalmitis.
Overall, patients improved after surgery 14.8 ± 27 letters on the ETDRS chart. This translates into approximately a 3-line mean improvement in vision. Out of the 178 follow-up visits, 122 (69%) patients had visual acuity improvement. Of these, 91 (51%) had visual acuity improved by 3 lines or more and 86 (49%) had less than 3 lines improvement.
Strabismus

From January through June 2006, 64 strabismus surgeries were performed. Twenty-four surgeries were for esotropia, 23 for exotropia, 4 for thyroid eye disease, 7 for 4th nerve palsy, 3 for 6th nerve palsy, and 1 each for Duane syndrome, Brown syndrome and a vertical deviation due to head trauma. Twenty-five procedures were performed on adults age 16 or older and on 39 children.
Outcomes were assessed at the latest follow-up, from 1 day to 6 months postoperatively. Outcomes were considered good if the deviation was less than 10 prism diopters in primary position in children, if diplopia disappeared in adults or, in a few cases, if an anomalous head position resolved.

Six adults and 18 children had esotropia. Results were good in five adults and 12 children. Three children were over or under corrected and no follow-up was available for one adult and three children at data collection. Five of the procedures were reoperations (two adults, both with good outcomes, and three children, two with good outcomes). Twelve adults and 11 children had exotropia. Results were good in 11 adults and eight children. There were no poor outcomes. No follow-up is available in 4 cases. Three adults required reoperations and all resulted in good outcomes. Four adults with thyroid eye disease underwent bilateral strabismus surgery. Outcomes were good in all four cases. None had to be treated afterward with prisms.

Fourth nerve palsy was addressed in seven cases. Six had a single eye operated on. The patient with bilateral surgery had a good outcome for one eye and a poor outcome for the other. There were one adult and six children. Outcomes were
good in the adult and in four children and poor in two children. These two patients will require surgery for another component of their strabismus. Two of the three with an abnormal head posture had an improved head position after surgery.

Sixth nerve palsy was operated in two patients, one adult and one child. Outcomes were good in both. One child with a vertical deviation and a sixth nerve palsy was successfully operated for the vertical deviation; he will undergo more surgery for esotropia. Outcomes were good for a child with Duane syndrome and one with Brown syndrome. An adult treated for a vertical deviation secondary to head trauma also had a good outcome.
Patient Experience

We ask our patients about their experiences and satisfaction with the services provided by our staff. Although our patients are already indicating we provide excellent care, we are committed to continuous improvement.

Outpatient Overall Rating of Care 2006

Outpatient Would Recommend Provider 2006
Outpatient Surgery
Overall Rating of Care 2006

Outpatient Surgery
Would Recommend Surgeon 2006
Innovations

Some New Innovations in 2006

New Tool for Measuring Corneal Biomechanical Properties Developed

Better understanding of corneal elasticity and strain might allow for more predictable outcomes after incisional and photoablative corneal surgery, enable identification of patients at risk for ectasia and lead to the development of methods for more accurate measurement of IOP.

Working at the cutting edge in this field, William J. Dupps, M.D., Ph.D., developed non-invasive technology for evaluating the biomechanical properties of the cornea. Along with collaborating biomedical engineers, he developed and is testing a system that uses high-speed optical coherence tomography (OCT) and sophisticated software to measure and map the magnitude and direction of tissue displacements within the layers of the cornea.

Dr. Dupps expects a technique for mapping corneal strain might find its most important application in the early detection of keratoconus and other corneal ectasias, where it could improve efforts to exclude at-risk patients from keratorefractive surgery and enhance sensitivity of genetic studies in which early recognition of the disease phenotype is critical.

(Provisional patent filed May 2006)
**Posterior Lamellar Endothelial Keratoplasty (PLEK)**

Corneal transplant specialists have embarked on cutting-edge lamellar corneal transplant procedures in which only the portion of the cornea that is diseased is replaced. Surgeons may now selectively transplant the endothelium for conditions such as pseudophakic bullous keratopathy and Fuchs’ endothelial dystrophy.

One variation of this procedure is Posterior Lamellar Endothelial Keratoplasty (PLEK), or as Descemet’s stripping automated endothelial keratoplasty (DSAEK). Cleveland Clinic surgeons were among the first in the nation to offer this transplant technique to patients, which provides recipients with faster visual recovery and more stable and predictable refractions than traditional penetrating keratoplasty.

Preop

Postop
Optical Coherence Tomography (OCT)

OCT is a non-invasive imaging technology used in the treatment and diagnosis of eye diseases such as diabetic retinopathy and macular holes. Cole Eye Institute houses the Digital OCT Reading Center (DOCTR), one of the leaders in the evaluation of OCT images. Trained personnel of DOCTR grade OCT scans for major clinical trials to help develop new treatments for blinding retinal diseases. DOCTR has developed standards for evaluating OCT being followed by physicians across the country.
New Sutureless Vitrectomy System

Our vitreoretinal surgeons assisted with the development of a sutureless vitrectomy system to improve patient comfort and outcomes with retinal surgery. The system uses specialized 23-gauge microincision cannulas that obviate the need for sutures at the end of retinal surgery. This microincision surgery may offer increased patient comfort, since no sutures are present, as well as faster visual recovery and shorter operative times.

However, complications such as hypotony and endophthalmitis appear to occur more often than in patients undergoing 20-gauge vitrectomy. Research to construct tighter and self sealing, nonleaking wounds is in progress to make microincision surgery safer.
Diabetic macular edema is the leading cause of visual loss in diabetic patients. Main treatment for diabetic macular edema is focal macular photocoagulation. Experimental therapies include the use of intravitreal steroids, the use of intravitreal sustained release implants, the use of protein kinase C ß inhibitors (Ruboxistaurin) and anti-VEGF inhibitors.

Approximately 15 years ago, Cole Eye Institute Chairman, Hilel Lewis, M.D., was the first to perform and report the use of vitrectomy for diabetic macular edema. Some patients with diabetic cystoid macular edema do not respond to any treatment. For these patients, Dr. Lewis is performing a new surgical treatment characterized by the creation of perifoveal retinal incisions to drain the intraretinal fluid in the macula.
New Muscle Positioning Technique for Strabismus Repair in Thyroid Eye Disease

A new surgical technique for positioning the insertion of the operated muscles was used in patients with diplopia and thyroid eye disease. The diagnosis was based on clinical characteristics and history of thyroid abnormalities. Strabismus surgery was performed on patients with stable clinical findings for at least 6 months. Patients who underwent orbital decompression were allowed to stabilize for at least 3 months before undergoing strabismus surgery. Exclusion criteria included <2 months of follow-up and previous strabismus surgery. Surgical outcomes were recorded two months, six months and one year after strabismus repair.

Excellent success was defined as no diplopia in primary and reading gazes without prisms. Good outcome was defined as no diplopia in primary and reading positions with the use of <10 prism dipters (Δ). Poor outcome was defined as persistent diplopia in primary or reading positions despite prisms or the inability of the patient to tolerate the necessary prisms.

Our novel technique of intraoperative relaxed muscle positioning for TRO-associated strabismus surgery allows for excellent results, with a low reoperation rate. It obviates the need for postoperative manipulation and can be used for patients with or without a history of orbital decompression.
New Knowledge

Selected Scientific Manuscripts


Selected Books and Book Chapters 2006


For complete information, consult our website: www.clevelandclinic.org/eye
Hilel Lewis, M.D.
Chairman, Division of Ophthalmology
Director, Cole Eye Institute

**Appointed:** 1993

**Medical Degree:** Universidad La Salle Escuela de Medicina
Mexico, City, Mexico

**Fellowship Training:** Johns Hopkins Hospital, Baltimore, MD;
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**Residency Training:** University of California, Los Angeles
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**Specialty Interests:** Complicated retinal detachments,
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diabetic retinopathy
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Andrew Schachat, M.D.
Vice Chairman for Clinical Affairs

Appointed: 2006

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Fellowship Training: Wills Eye Hospital, Philadelphia, PA

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Specialty Interests: Age-related macular degeneration, clinical trials, diabetic retinopathy

Staff Listing | Vice Chairman for Education

Elias Traboulsi, M.D.
Vice Chairman for Education

Appointed: 1997

Medical Degree: American University of Beirut, Beirut, Lebanon

Fellowship Training: Children’s Hospital National Medical Center, Washington, DC; Johns Hopkins Hospital, Baltimore, MD

Residency Training: Georgetown University Hospital, Washington, DC

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For more details about maps and locations, visit www.clevelandclinic.org/maps
Cleveland Clinic Overview

Cleveland Clinic, founded in 1921, is a not-for-profit academic medical center that integrates clinical and hospital care with research and education. Today, 1,700 Cleveland Clinic physicians and scientists practice in 120 medical specialties and subspecialties.

Cleveland Clinic’s main campus, with 41 buildings on 130 acres in Cleveland, Ohio, includes a 1,000-bed hospital, outpatient clinic, subspecialty centers and supporting labs and facilities. Cleveland Clinic also operates 13 family health centers, eight community hospitals, two affiliate hospitals, and a medical facility in Weston, Florida.

At the Cleveland Clinic Lerner Research Institute, hundreds of principal investigators, project scientists, research associates and postdoctoral fellows are involved in laboratory-based research. Total annual research expenditures exceed $150 million from federal agencies, non-federal societies and associations, and endowment funds. In an effort to bring research from bench to bedside, Cleveland Clinic physicians are involved in more than 2,400 clinical studies at any given time.

In September 2004, Cleveland Clinic Lerner College of Medicine of Case Western Reserve University opened and will graduate its first 32 students as physician-scientists in 2009.

For more details about Cleveland Clinic, visit clevelandclinic.org
Online Services

eCleveland Clinic

eCleveland Clinic uses state-of-the-art digital information systems to offer several services, including remote second opinions through a secure Web site to patients around the world; personalized medical record access for patients; patient treatment progress access for referring physicians (see below); and imaging interpretations by the Department of eRadiology’s subspeciality trained academic radiologists. For more information, please visit eclevelandclinic.org.

DrConnect

Online Access to Your Patient’s Treatment Progress

Whether you are referring from near or far, our new eCleveland Clinic service, DrConnect, can streamline communication from Cleveland Clinic physicians to your office. This new online tool offers you secure access to your patient’s treatment progress at Cleveland Clinic. With one-click convenience, you can track your patient’s care using the secure DrConnect Web site. To establish a DrConnect account, visit eclevelandclinic.org or e-mail drconnect@ccf.org.

MyConsult

MyConsult Remote Second Medical Opinion is a secure, online service providing specialist consultations and remote second medical opinions for more than 600 life-threatening and life-altering diagnoses. MyConsult remote second medical opinion service allows you to gather information from nationally recognized specialists without the time and expense of travel. For more information, visit eclevelandclinic.org/myconsult, e-mail eclevelandclinic@ccf.org or call 800.223.2273, ext 43223.
Cleveland Clinic Contact Numbers

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Cleveland Clinic is determined to exceed the expectations of patients, families and referring physicians. In light of this goal, we are committed to providing accurate and timely information about our patient care.

Through participation in national initiatives, we support transparent public reporting of healthcare quality data and participate in the following public reporting initiatives:

- Joint Commission Performance Measurement Initiative (www.qualitycheck.org)
- Centers for Medicare and Medicaid (CMS) Hospital Compare (www.hospitalcompare.hhs.gov)
- Leapfrog Group (www.leapfroggroup.org)
- Ohio Department of Health Service Reporting (www.odh.state.oh.us)

In addition, this publication was produced to assist patients and referring physicians in making informed decisions. To that end, information about care and services is provided, with a focus on outcomes of care. For more information, please visit the Cleveland Clinic Quality Web site at clevelandclinic.org/quality.
Cleveland Clinic

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Cleveland Clinic is a not-for-profit multispecialty academic medical center. Founded in 1921, it is dedicated to providing quality specialized care and includes an outpatient clinic, a hospital with more than 1,000 staffed beds, an education division and a research institute.

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