NEW DEVELOPMENTS IN CORNEAL TOPOGRAPHY
Michael W. Belin, MD, Stephen S. Khachikian, MD

ENDOTHELIAL KERATOPLASTY: A SIMPLE AND EASY DSAEK TECHNIQUE TO AVOID COMPLICATIONS
Mark A. Terry, MD

EFFICACY OF ISOPROPYL ALCOHOL 70% VERSUS SODIUM HYPOCHLORITE FOR GOLDFMANN TONOMETER PRISM DISINFECTION IN CLINICAL SETTING
Chun Cheng Lin Yang, MD, Carlos M. Portocarrero, MD, Carmen María González López, Arturo Roberto Quevedo, MD
Persistencia

TRAVATAN®, potencia y control persistentes más allá de las 24 horas después de administrado.¹

Horas transcurridas después de la dosis a las 8 PM.

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TRAVATAN® Solución Oftálmica está indicada para la reducción de la presión intraocular elevada (PIO) en pacientes con glaucoma de ángulo abierto o con hipertensión ocular que presentan intolerancia o cuya respuesta a otros medicamentos que reducen la PIO es insuficiente (fallan en alcanzar la presión intraocular esperada después de múltiples medicaciones en el tiempo cuando usan otros medicamentos).

Ha sido reportado que TRAVATAN® Solución Oftálmica causa cambios en los tejidos pigmentados. Los cambios más frecuentemente reportados han sido el aumento de la pigmentación del iris y del tejido pericrínico (cápilares) y el aumento de la pigmentación y crecimiento de las pestañas. Estos cambios pueden ser permanentes.

La dosis recomendada es una gota en ojo(s) cajo(s) una vez al día, a la noche.

Por favor lea la información sobre su prescripción en la página adyacente.
Es un placer y un honor asumir la presidencia de la Asociación Panamericana de Oftalmología. Seguir los pasos y pararnos en los hombros de mis muy distinguidos predecesores. Somos la suma de su esfuerzo en liderazgo y estoy muy agradecido por el empeño y dedicación que en las últimas décadas realizaron para mejorar la calidad de atención a nuestros pacientes en las Américas.

Es tiempo de ver hacia adelante. Quiero compartir mis ideas y planes para la dirección de la Panamericana en los siguientes dos años.

Nuestras prioridades no han cambiado.

1. Compromiso con la educación.

2. Prevención de ceguera.

3. Intercambio de ideas, cultura y amistad.

Esta sigue siendo la base sobre la cual construimos el futuro. ¿Cómo vamos a lograr nuestras metas, continuar el crecimiento de nuestra organización y a mismo tiempo enfrentar los cambios que se encuentran adelante?

**Primeramente:**

Debemos reconocer que vivimos en una comunidad global:

- Debemos entender la mano y asistirnos con otras sociedades supranacionales, nacionales e internacionales, para aprender y compartir nuevas ideas y conceptos.

**Segundo:**

Debemos reconocer que tenemos en nuestros jóvenes colegas, enormes talentos y compromiso con nuestra profesión.

- En los años pasados, muchos de estos hombres y mujeres fueron ya identificados a través de las sociedades nacionales y de nuestro Programa de Desarrollo de Liderazgo.

- Estaremos invitando a muchos de nuestros nuevos líderes a que se conviertan en miembros o directivos de nuestros muchos comités activos.

- Trabajando con nuestra Fundación y su nuevo presidente, el Dr. Rubens Bellfort, estamos expandiendo el alcance de ésta, para crear nuevas oportunidades y que residentes y oftalmólogos jóvenes obtengan fondos para becas e investigación.

**Tercero:**

- Debemos mejorar nuestros esfuerzos en prevención de ceguera en América Latina. En este aspecto estamos implementando nuevas ideas y programas.

- A través de nuestra Fundación, estamos promoviendo una campaña de recolección de fondos “Compa visión en América Latina” para poder mejorar la educación y el tratamiento de pacientes con Retinopatía del Prematuro.

- Bajo el dedicado liderazgo de Francisco Contreras, estamos considerando nuevas formas de atención como una nueva e innovadora tecnología para el tratamiento de ceguera por retinopatía macular.

- Estamos construyendo y fortaleciendo nuestras alianzas con organizaciones internacionales como el CIO, OMS, AIPC, ORBIS, y la AAO, eso nos permite disponer de un material educativo más completo para oftalmólogos.

El trabajar con estas organizaciones ayudará a que la Panamericana mejore la atención de pacientes a lo largo de las Américas y más allá. Las raíces de nuestra organización iniciaron en mayo de 1939 — hace 68 años, inmediatamente después de la reunión anual de la AAO en Cleveland. En nuestro siguiente congreso en San Francisco 2009, la Panamericana tendrá 70 años de existencia. Nada más apropiado que un congreso conjunto con la AAO para celebrar juntos este importante aniversario.

Finalmente, y en nombre del Comité Ejecutivo y la Mesa Directiva de la Panamericana, quiero felicitar y agradecer personalmente al Dr. Rafael Sánchez Fontán y al comité organizador de la Sociedad Mexicana de Oftalmología, como al comité científico Panamericano y a nuestro dedicado personal, por el increíble esfuerzo que en Junio pasado produjo en Cancún un sobresaliente XVII Congreso Panamericano. Quiero también agradecer a nuestros socios en la industria por su continuo apoyo y generosidad.

Construyendo sobre los líderes talentosos que me antecedieron, soy optimista para el futuro de nuestra organización. Espero esta oportunidad para servir como su próximo Presidente en la Asociación Panamericana de Oftalmología. Acepten mi invitación para unirse a nuestra misión de mejorar la educación, la atención de pacientes y las oportunidades de investigación, tanto ahora como en el futuro.

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**It is indeed my pleasure and honor to assume the presidency of the Pan American Association of Ophthalmology and follow in the footsteps and stand on the shoulders of my most distinguished predecessors. We are the sum of their leadership efforts and I am most grateful for their hard work and dedication to improving the quality of care for our patients in the Americas over the past decades.**

**It is now time to look forward. I would like to share my ideas and plans for the direction of the Pan-American over the next two years and how each member can join me by participating in this effort.**

**Our priorities have not changed:**

1. Commitment to Education.
2. Prevention of Blindness.
3. Exchange of ideas, culture and collegiality.

**These all remain the foundation on which we build for the future. How will we accomplish our goals and continue to grow our organization and meet the challenges that lie ahead?**

**First:**

- We must recognize that we now live in a global community:
  - We must reach out and partner with other supernatural, national and international societies to learn and share new ideas and concepts.

**Second:**

We must recognize that we have enormous talent and commitment to our profession from our younger colleagues:

- Many of these men and women have already been identified through our Leadership Development Program and national societies over the past several years.

- We will be inviting many of our new leaders to become members or chairs of our many active committees.

- Working with our Foundation board and its new President, Dr. Rubens Bellfort, we are expanding the Foundation outreach to provide greater op-
portunities for residents and young clinician scientists to obtain funding for scholarships and start-up Research Grants.

**Third:**
We must improve our efforts for Prevention of Blindness in Latin America. In this regard, several new ideas and proposals are being implemented:
- Through our Foundation, we are promoting a fundraising campaign "Buy Vision in Latin America" to raise money to help support patient care and education in the prevention and treatment of Retinopathy of Prematurity.
- Under the dedicated leadership of Francisco Conteras, we are looking at new and innovative technology and improved delivery systems for treatment of cataract blindness among the poor.
- We are building and strengthening our alliances with international organizations such as the ICO, WHO, IAPB, ORBIS as well as the AAO, which has the most comprehensive educational material available for ophthalmologists.
- By working with these organizations it will help the Pan American im prove patient care throughout the Americas and overseas.

The roots of our organization was started in May 1939 – 68 years ago. immediately following the Annual Meeting of the AAO in Cleveland. At our next Congress in San Francisco in 2009, the Pan American will be 70 years old! It is fitting to be having a Joint Congress with the AAO to celebrate this important anniversary together.

Finally, on behalf of the Pan American Executive Committee and Board of Directors, I would like to personally congratulate and thank Dr. Rafael Sanchez Fontan and the Organizing Committee of the Mexican Society of Ophthalmology, as well as the Pan American Scientific Program committee and our dedicated staff for their incredible effort in producing an outstanding XVII Pan American Congress in Cancun this past June. I would also like to thank our industry partners for their continued support and generosity.

Building on the talented leaders that have served before me, I am optimistic for the future of our organization. I look forward to having this opportunity to serve as your next President of the Pan-American Association of Ophthalmology. Please accept my personal invitation to join in our mission to improve education, patient care, and research opportunities both now and in the future.

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**Segundo:**
Precisamos reconhecer que temos muito talento e compromisso para com nossa profissão provenientes dos colegas mais jovens.
- Muitos destes homens e mulheres já foram identificados pelo nosso Programa de Desenvolvimento de Líderes e por sociedades nacionais nos últimos anos.
- Vamos convidar muitos destes novos líderes a se tornarem membros ou chefes dos nossos comitês.
- Trabalhando com a comissão de diretores da Fundação e o seu presidente, Dr. Rubens Belfort, estamos fazendo com que a Fundação propicie melhores oportunidades para os residentes e novos cientistas clínicos na obtenção de bolsas de estudos e “Grants” para pesquisas.

**Terceiro:**
Precisamos aumentar nossos esforços na prevenção da cegueira na América Latina. Para este fim, novas propostas e ideias estão sendo implantadas:
- Através da Fundação, estamos promovendo uma campanha “Buy Vision in Latin America” para angariar fundos para assistência aos pacientes e educação sobre a prevenção e o tratamento da retinopatia de prematuridade.
- Com a dedicação do líder Francisco Conteras, estamos procurando tecnologias inovadoras e por melhorias nos sistemas para o tratamento de cegueira secundária a catarata na população pobre.
- Estamos construindo e expandindo nossas alianças com organizações internacionais como ICO, WHO, IAPB, ORBIS, assim como também AAO, a qual disponibiliza material educacional mais abrangente para oftalmologistas.

Trabalhando com estas organizações vai ajudar a “Pan-American” a melhorar a assistência aos pacientes em todas as Américas. As raízes de nossa organização surgiram em Maio de 1939, 68 anos atrás, imediatamente após o Encontro Anual da AAO em Cleveland. No nosso próximo congresso em San Francisco em 2009, a “Pan-American” vai completar 70 anos! Estamos pertos de promover um Congresso em conjunto com a AAO para celebrarmos este aniversário juntos.

Finalmente, em nome do Comitê Executivo da “Pan-American” e do Conselho de Diretores, gostaria de parabenizar e agradecer ao Dr. Rafael Sanchez Fontan e ao Comitê Organizador da Sociedade Mexicana de Oftalmologia, assim como também a Comissão do Programa Científico pelo esforço na produção do congresso do XVII Congresso Pan Americano em Cancun no último mês de Junho. Também gostaria de agradecer nossas indústrias parceiras pela generosidade e suporte contínuo.

Construindo sobre o talento dos líderes que me antecederam, estou otimista para o futuro da nossa organização. Espero ter esta oportunidade de serví-los como próximo Presidente da Associação Pan-Americana de Oftalmologia. Por favor aceitem meu convite pessoal para juntarem-se a nós com a missão de melhorar a educação, a assistência aos pacientes e aumentar as oportunidades de pesquisa tanto agora como no futuro.
New Developments in Corneal Topography

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Introduction

The increased frequency of refractive surgery and the shift toward the correction of higher order aberrations necessitates a more detailed understanding of the complexity of corneal shape. Computerized corneal modeling (corneal "topography") has increased our knowledge beyond what was previously possible with earlier examination techniques (keratometer, Placido disc, etc.).

The term "topography" is, for the most part, a misnomer. True topography implies knowledge of the exact contour or shape.

Most topography systems, however, are placido-based. The term "videokeratoscope" more accurately reflects the technology of these instruments. Placido systems measure the angle of reflection and compute curvature. The understanding of the distinction (between curvature and shape) is of paramount importance to fully understand both the limitations of placido based systems and some of the advantages of the newer elevation (shape) based systems.

Historical background

Efforts to obtain qualitative information about the shape of the entire cornea led to the development of keratoscopic imaging modalities. Whereas the keratometer only analyzes approximately 6% of the corneal surface, keratoscopy can evaluate about 70% of the total corneal area (limited by the optics of the reflecting system itself). While keratoscopy provided qualitative information, it was the union of computer analysis and digital video by Klyce in 1964 that transformed the gross examination of the cornea into the high-speed world of computer imaging.

The measurement of curvature (either in dioptr or radius of curvature) was somewhat intuitive for ophthalmologists, who for over a hundred years have relied on keratometers to determine the "shape" of the cornea. The difference between curvature and true shape, however, was often missed and the erroneous assumption was made that curvature (sagittal curvature was the most commonly displayed) reflects shape or that curvature data could be utilized to reconstruct the corneal surface.

Curvature is a referenced based measurement. This means that the measured curvature will vary based on the reference axis being used. This axis is not a fixed, but represents the normal that the videokeratograph makes with the corneal surface. This "normal line" is not a property of the cornea and will typically change with any change in the anterior corneal surface. A normal astigmatic cornea can appear "abnormal" if the reference is not through the geometric center.

![Figure 1:](image)

This inherent limitation of curvature initially lead to the high incidence of false positive keratoconus screenings (as high as 17% in some reports). Further refinements have improved on the ability of videokeratoscopes to differentiate normal from abnormal eyes, but these improvements still cannot overcome the inherent limitation of a curvature measurement itself.

Elevation-Based Topography Systems

True "topography" implies shape and requires the generation of an X, Y and Z coordinate system. Elevation based systems utilize a direct triangulation technique to measure the anterior corneal surface. The first commercially available elevation system was developed in the late 1980's. The PAR Corneal Topography System (CTS) (PAR Technology, New Hartford, NY) measure anterior elevation topography by using the principles of raster photogrammetry. In this technique a grid pattern was projected onto the corneal surface from an oblique angle and the distortion of the known pattern was measured. Accurate elevation data was produced, but was limited to the anterior corneal surface.

In 1995, the Orbscan (Bausch & Lomb, Rochester, NY) was introduced. Using a slit-scanning beam combined with a placido disk, the curvature and elevation of the anterior and posterior surfaces of the cornea could be assessed. Questions, however, about the accuracy of the Orbscan, particularly in irregular corneas remain.

Recently, the Oculus Pentacam (Oculus, Inc, Duerenfelen, Germany) became commercially available utilizing a rotating Scheimpflug camera to measure both the anterior and posterior corneal surfaces. The Scheimpflug camera rotates 360 degrees around a single point of fixation as the patient focuses on a central light source. The images are captured over 180 degrees on the patient’s temporal side. The Pentacam then takes the 25,000 data points collected during the scan and reformats them, creating the various topographical maps.

Clinical applications of elevation based topography

Keratoconus and Keratoconus suspect

The identification of patients with keratoconus is an important application of preoper-
Figure 2:
A comparison of the anterior elevation topography of astigmatism (a) and keratoconus (b). Astigmatism yields positive elevation off the best-fit-sphere (BFS) in the flat meridian and negative deviation in the steep meridian increasing towards the periphery, while in keratoconus the cone is revealed by central or paracentral positive elevation in an island pattern.

Figure 3:
A map composite display (pachymetry, sagittal curvature, anterior and posterior elevation) (OCULUS Pentacam) showing significant inferior steepening on the anterior curvature map (black arrow). The elevation map shows that the "apex" is slightly displaced (green arrow), but otherwise normal. This displaced apex causes a "false positive" on a curvature map because curvature is a referenced-based measurement. This is the clinical situation demonstrated by the astigmatic test object in Figure 2.

Lasik and most refractive procedures are contraindicated in keratoconus patients due to the potential for the disease to progress rapidly after surgery. Additionally, "forme fruste keratoconus" or early keratoconus is often considered a contraindication to LASIK due to the possible progression into clinically significant disease. While the incidence of clinically significant keratoconus is 0.03% to 0.05% in the general population, it may be as high as 6% to 17% in some refractive centers. These original high estimates were mainly due to the misinterpretation of early curvature maps that showed a high incidence of inferior corneal steepening. Subsequently, it was learned that many of these so-called "keratoconus suspects" had otherwise normal corneas, but exhibited a displaced apex (see below.)

Displaced apex syndrome
Early studies reported a high incidence of "forme fruste" keratoconus or "keratoconus suspect" in patients seeking refractive surgery. Certain investigators initially pointed out that this high false-positive rate was related to the limitations of axial-based curvature reconstructions and placido-derived topography systems. The source of error was related to the difference between the corneal sighting point, the corneal apex, and the topographic vertex normal (point of refer-
ence on the cornea that is normal to the axis of the videokeratoscope. Many of these so-called keratoconus patients have what is now recognized as an inferiorly displaced corneal apex. These patients demonstrate an elevated I-S ratio, inferior corneal axial power > 1.5D steeper than the comparable superior corneal region. However, they have no other clinical or topographic aspects of keratoconus. The distinction between true keratoconus and a curvature based false-positive due to a displaced apex is clearly demonstrated on an elevation map. FIGURE 3Patients with a displaced apex syndrome typically have normal pachymetry, orthogonal astigmatism, stable refractions, and BSCVA of 20/20 or better. Subsequent studies have revealed that patients with a displaced apex but otherwise normal exams are associated with outcomes for myopic surgery that are not significantly different from the general population.

Posterior Corneal Surface
In the past, many clinicians either did not have systems capable of measuring the posterior surface or utilized systems where the accuracy of posterior measurements was questionable. This leads to the false belief that posterior corneal surface measurements are not as important as those from the anterior surface. While it is true, that changes on the posterior cornea are less important optically (as the anterior cornea represents the major refracting surface of the eye) posterior corneal surface measurements are critical for refractive surgical screening. Posterior measurements are often the first indicators of future ectatic disease, in spite of completely normal anterior curvature. Examination of the posterior corneal surface can often reveal pathology that would otherwise be missed if one was relying on anterior curvature analysis. FIGURE 4

Pachymetric Distribution Maps
Accurate measurement of the posterior corneal surface is a requisite for accurate pachymetry maps, as the corneal thickness is computed from the difference between the anterior and posterior corneal surfaces. While ultrasound is the most commonly used device for measuring corneal thickness, it has a number of limitations, most important of which is that it only gives you a single measurement at the so-called "apex" of the cornea.

We recently looked at 1,436 pre-operative eyes using the Oculus Pentacam and recorded corneal thickness at the apex, pupillary center and the thinnest reading (Table 1).

Table 1:

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<tr>
<th></th>
<th>Apex</th>
<th>Pupil</th>
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<th>Apex-Pupil</th>
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<td>Mean</td>
<td>539.3</td>
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<tr>
<td>Median</td>
<td>530.0</td>
<td>530.0</td>
<td>537.9</td>
<td>1.0</td>
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<td>0</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>S.D.</td>
<td>36.8</td>
<td>36.9</td>
<td>37.12</td>
<td>1.73</td>
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<td>Range</td>
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<td>409-664</td>
<td>0.31</td>
<td>0.93</td>
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The average thickness readings at the apex (539.3 μm), pupil center (538.8 μm) and the thinnest reading (536.3 μm) were similar. The differences between the apex and both the pupillary center and the thinnest region were also small with a relatively tight standard deviation (1.06 +/- 1/73, 2.99 +/- 4.34 respectively). The range, however, did show a few significant outliers. At least one patient had a 31 μm difference between their apex and pupil center reading and up to 93 μm comparing the thinnest region to the apex.

Could the difference between the corneal apex and the pupil center or the apex and the thinnest zone account for some of the cases of ectasia without apparent cause? Estimates on the frequency of post-operative ectasia run from a low of 1/6207 to a high of 1/2500 with the later being a more recent estimate. In the 1,436 eyes studied at least one eye had a difference between apex and pupil center and apex and thinnest area of 31 and 93 μm respectively, more than enough.
to be a significant confounding variable that could account for some cases of iatrogenic ectasia of unknown cause. **FIGURE 5**

**Future horizons / conclusion**

Accurate determination of the true shape of the cornea is still an evolving science. While there is little disagreement in diagnosing clinically evident keratoconus, agreement on what constitutes "form fruste" or pre-clinical keratoconus remains elusive. The analysis of both anterior and posterior corneal surfaces and the corneal pachymetry distribution appears to add significantly to our ability to identify "at risk" eyes. As more knowledge is gained, it is appreciated that a total understanding of the behavior of the human eye requires the knowledge obtained from both anterior and posterior topography and pachymetric distribution. Refractive surgeons need to understand topography in order properly screen patients and may at times have to choose a procedure (LASIK, Surface Treatment, CK, Phakic IOL) or at times not proceed based on topographic findings.

**REFERENCES**

Endothelial Keratoplasty: A Simple and Easy DSAEK Technique to Avoid Complications

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Dr. Terry has a small financial interest in the specialized DLEK/DSAEK instruments that he designed for Bausch and Lomb, Inc.
Dr. Terry receives compensation for the training of visiting surgeons in the DLEK/DSAEK/DSAEK procedure.

INTRODUCTION

Endothelial keratoplasty (EK) has undergone rapid changes in technique since the original procedure by Gerrit Melles in 1992 as “posterior lamellar keratoplasty” (PLK) and then modified and developed by Mark Terry in 1999 as “deep lamellar endothelial keratoplasty” (DEK). The procedure was found to be effective but difficult. The recent technique modification of simply removing recipient Descemet’s membrane and then placing a donor stromal and endothelial lenticule onto the back surface of the cornea has made surgery much easier and has opened up EK for general use. This technique has been termed “Descemet’s stripping endothelial keratoplasty” (DSEK), and when a microkeratome is used to prepare the donor tissue, the technique has been called “Descemet’s stripping automated endothelial keratoplasty” (DSAEK). While Terry et al. have shown that the technique of DSAEK has improved the optics of EK by creating a smoother horizontal donor-recipient interface (and hence yielded faster and better visual results) the complication rate of dislocation of the donor tissue after DSAEK surgery increased dramatically from 5% to 20% in 2011. In addition, the donor manipulations in DSEK and DSAEK increased the rate of late posterior primary graft failure to levels much higher than standard keratoplasty or DLEK surgery. The published dislocation rate after various techniques of DSEK/DSAEK surgery has recently been reported as 35% (9/26 eyes) by Koenig et al., 25% (4/16 eyes) by Gorovoy, 14% (3/22 eyes) by Nieuwendaaal and Melles, 6% (4/64 eyes) by Price et al., and 4% (4/100) by Terry et al. Each of these surgeries uses a different technique of DSAEK surgery, and the incidence of late graft failure (requiring an early second transplantation surgery) also varies. The published graft failure rate was 14% (3/22 eyes) by Nieuwendaaal and Melles, 12% (3/26 eyes) by Koenig et al., 7% (1/16 eyes) by Gorovoy, 3% (7/200 eyes) by Price et al., and 1% (1/100 eyes) by Terry et al.

In this paper we present our current method of DSAEK surgery which has made DSAEK surgery easier to perform and at the same time has significantly reduced the complication rates from the results reported above. (Figure 1) Videos of our technique and more extensive information can be found on our research website: dlek-dsaeik.com

DSAEK Surgical Technique

We perform all of our surgery with retrobulbar injection anesthesia. Antibiotic drops are given pre-operatively, and the pupil is dilated pre-operatively if concurrent cataract surgery is planned. We believe that if cataract surgery is necessary, that it should be done at the same time as the DSAEK surgery to allow the patient only one trip to the operating room.

The DSAEK surgery begins with a temporal limbal peritomy to allow a 5 mm length scleral incision, one mm peripheral to the limbus. A scleral tunnel pocket is formed into clear cornea. Two paracentesis incisions are made through the clear corneal limbus on either side of the pocket. The chamber is filled with Healon (Alcon, Fort Worth, TX). It is imperative that only a very cohesive viscoelastic such as Healon is used for EK surgery, because dispersive viscoelastics such as Viscoat (Alcon, Fort Worth, TX) can coat the recipient bed and prevent later adhesion of the donor. We have used Healon safely now in over 500 cases of EK surgery and have never found any Healon left behind in the interface. By using Healon for DSAEK, an irrigating anterior chamber maintainer is entirely unnecessary.

It is at this point that the anterior chamber can be entered with a 3.0 mm blade through the scleral pocket incision and phacoemulsification cataract surgery can be performed using the surgeon’s preferred method. It is advised, however, that the anterior capsulotomy be only 4 or 5 mm in diameter in order to fully stabilize the IOL for the subsequent DSAEK surgery. If the crystalline lens does not have a significant capsulotomy, then DSAEK can be performed, leaving the lens in place.

After cataract surgery, the surface epithelium of the cornea is marked with an 8.0 mm to 8.5 mm circular template mark. A blunt-tipped, angled, reverse Sinskey hook (Bausch and Lomb, St. Louis, MO) is then placed through the paracentesis site and used to break through Descemet’s membrane and score the membrane, following the path of the overlying 8.0 mm template mark. It is important to use a blunt hook, such as a sharp hook or needle will penetrate into the overlying stromal tissue and make the scoring and stripping of Descemet’s membrane very difficult. Once scored for 360 degrees, the same hook is used to easily peel Descemet’s membrane off, and it is then removed from the eye. At this point of the surgery, our technique differs from other prominent EK surgeons. We advocate scraping the peripheral recipient bed to promote later donor adherence and have previously described the histology and rationale behind this approach. With Healon filling the anterior chamber, a Terry Scraper (Bausch and Lomb, St. Louis, MO) is used to scrape the peripheral 1 mm of the recipient bed, leaving the central 6 mm of the recipient bed glassy smooth for vision. The peripheral tufts of white fibris created by the Terry scraper are easily seen and are not subtle. However, they are completely clear at just 6 weeks after surgery and the scraping does not affect vision. The entrance wound of the scleral pocket is then enlarged to the full
Figure 1:

1a: The surface of the recipient cornea is marked with a circular template of 0.6 to 0.8 mm diameter, depending on the size of the cornea.
1b: A 3.0 mm scleral incision adjacent to the temporal limbus is made, and a scleral-corneal pocket incision is made into clear cornea.
1c: The anterior chamber is completely filled with Healon, and a blunt-tipped Sinskey hook is used to break through and score the recipient Descemet’s membrane, following the path of the overlying circular template.
1d: The recipient Descemet’s membrane is easily stripped from the posterior surface using the same blunt-tipped Sinskey hook, while the chamber is maintained with Healon.
1e: The Terry Sinskey is used to scrape the peripheral recipient bed to create a white stromal fibrin that will promote donor tissue edge adhesion.
1f: All of the Healon is easily removed from the eye with an irrigation-aspiration tip.
1g: The donor tissue is prepared using a microkeratome knife to cut a free anterior corneal button from the donor tissue, leaving a posterior residual tissue of between 125 μm and 175 μm.
1h: The donor posterior disc is punched out using a same diameter trephine, and after a strip of Healon is placed on the central endothelium, the tissue is folded into a 60/40% "taco" shape to prepare for insertion.
1i: Special chopsticks are used to grasp the donor tissue and insert it into the recipient anterior chamber.
1j: The chamber is deepened with balanced salt solution to begin unfolding the tissue and then the tissue unfolding is completed with placement of an air bubble between the lips of the taco.
1k: Once the donor tissue is unfolded and in position, with the chamber filled with air, the Cindy Sweeper is used to remove interface by compressing the surface and "milking" the fluid from the center to the periphery.
1l: The air in the chamber is replaced with balanced salt solution, dilating drops are placed on the surface, and a residual air bubble with a diameter that just covers the donor tissue is left in place.
air, the specialized “Cindy Sweeper” (Bausch and Lomb) is used to compress the surface of the cornea and sweep from the center to the periphery, repeatedly for about 2 minutes. This maneuver “mills” any interface fluid out and stabilizes the graft. We have not found it necessary to perform full thickness stab incisions to remove interface fluid. We then turn off the microscope light and leave the tissue completely undisturbed for 10 minutes. Dilating drops of cyclopentolate 1% and phenylephrine 2.5% are placed at this time.

After 10 minutes, the air bubble is completely removed and replaced with BSS and the pressure normalized. A final air bubble of only 8 or 9 mm is then placed into the anterior chamber to support the graft, making sure that this final air bubble is freely movable. A 24 hour collagen shield soaked in antibiotic and steroids is then applied, the eye is gently patched and the patient taken to the recovery room. The patient is instructed to remain supine for one hour after surgery and then as much as possible until seen the next day when the patch is removed.

Current Clinical Results and Complications

We have used the technique described above for about 175 cases of DSAEK. We have experienced 3 cases of dislocation in that series (2%), and at this time have not had a single dislocation into the anterior chamber of the donor tissue in any of our recent 140 consecutive cases. We have had two grafts which we replaced (1%) in this series. Most importantly, by leaving a freely movable, smaller air bubble of only 9.0 mm or less, we have never had a case of pupillary block in any of our entire PK series of 500 cases.

The visual results after DSAEK surgery can be dramatic. (Figure 2) Evaluating our first 56 DSAEK eyes to reach the 6 month post-operative examination, we found that in those eyes without retinal pathology, fully 90% achieved 20/40 or better vision, 30% achieved 20/25 or better vision, and 10% achieved 20/20 or better vision. A cause of concern, however, is that the donor endothelial cell loss at 6 months after DSAEK surgery appears to be higher than the 25% cell loss which we found in our prior small incision DLEK series.13 Our first 75 cases of DSAEK to reach the 6 month post-operative examination show a 35% donor endothelial cell loss.14 Our results are comparable to the very small series reports of others including the 40% cell loss (n=16...
eyes) reported by Gorovoy and the 31% cell loss (n=7 eyes) reported by Nieuwenhau and Melles. Therefore, despite the improvement in visual results after DSAEK surgery, the early endothelial cell loss appears to be higher than DLEK. Long term, prospective data on endothelial survival is needed to determine what percentage of DSAEK eyes may require repeat grafting due to late endothelial failure.

CONCLUSIONS

Endothelial keratoplasty is an exciting new procedure for the selective replacement of diseased endothelium. We believe that the technique of DSAEK that we describe here is currently the easiest and safest technique currently available, and we encourage the corneal transplant surgeon to add this method of DSAEK to his/her surgical repertoire.

REFERENCES

Efficacy of Isopropyl Alcohol 70% versus Sodium Hypochlorite for Goldmann Tonometer Prism Disinfection in a Clinical Setting

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ABSTRACT

PURPOSE: To determine the efficacy of isopropyl alcohol 70% versus sodium hypochlorite in the disinfection of Goldmann tonometer prism in a clinical setting.

DESIGN: Prospective, randomized, comparative clinical study.

METHODS: Isopropyl alcohol 70% and sodium hypochlorite were compared to a control group in a total of eighty-one tonometer prism used in different patients.

MAIN OUTCOME MEASURES: Efficacy of isopropyl alcohol 70% and sodium hypochlorite in the disinfection of Goldmann tonometer prism.

RESULTS: No statistical difference was found between isopropyl alcohol 70% and sodium hypochlorite in bacterial elimination (100%) as compared to the control group.

CONCLUSION: Results suggest that tonometer prism disinfection might not be necessary unless infection susceptibility factors such as corneal deformities and conjunctivitis or systemic infections are present.

INTRODUCTION

Over the last decades, there have been many studies in the literature reporting the recovery and culture of different infectious microorganisms, including deadly viruses such as the HIV, Hepatitis B and C, and the Creutzfeldt-Jacob Disease virus from ocular tissues and secretions, including tear, 1, 10, 12, 15, 16, 20, 25, 26 A complete ophthalmologic exam requires measuring a patient’s intracocular pressure (IOP), and the gold standard for IOP determination is the Goldmann tonometer, a contact method. Therefore, any patient undergoing an ophthalmologic examination, which includes contact tonometer determination of intracocular pressure, should be considered a potential transmitter or acquirer of an infectious disease via ocular tissue or secretion. Ophthalmologic instrumentation disinfection is vital in preventing infectious disease transmission in ophthalmology. The American Academy of Ophthalmology (AAO) and the Center for Diseases Control and Prevention (CDC) have established a series of guidelines for disinfection agents in ophthalmologic instrumentation. 5, 8, 9, 10, 11, 12, 18, 20 In our developing nations of Central America, however, there are no clear guidelines for ophthalmologic instrumentation disinfection.

Due to the lack of clear guidelines for disinfection agents in ophthalmologic instrumentation in Central America, at the Unidad Nacional de Oftalmología (U.N.O.) in Guatemala City, we use a variety of disinfection methods. Isopropyl alcohol 70% is the disinfecting agent of choice for tonometer prism cleaning at our center. However, in the absence of control of this disinfectant, it has been performed at our center, we decided to determine its efficacy in tonometer prism disinfection comparing it to sodium hypochlorite, another chemical agent accepted by the AAO disinfection guidelines as an effective disinfectant. 32

METHODS

During the first two weeks of November 2004, eighty-one (81) patients who attended our center, U.N.O., for a routine ophthalmologic exam were selected randomly. Patients 12 years and older, who did not report history of systemic infectious disease, or any active ocular infection were included. Exclusion criteria were history of systemic infectious disease such as HIV or Hepatitis, corneal ulcers, diseases of corneal surface irregularity and active ocular infections such as infectious conjunctivitis or blepharitis. Of these patients, three groups of 27 patients were formed, and for each group, a disinfectant was assigned randomly. After each IOP determination, the tonometer prism was cleaned by the wiping method, using sterile gauze soaked with the assigned disinfectant. 81 commercially available sterile individually packed tonometer prisms (Luneau-Tonoret 147124) were used for IOP determination of these patients. For the first group of patients, no disinfectant was used on the tonometer prism after IOP determination. For the second group, isopropyl alcohol 70% was used, and for the third group of patients, sodium hypochlorite was the disinfectant utilized. In each group of patients, a sample for culture was collected from the tonometer prism using sterile methods. Also, on each patient we performed a conjunctival swab for gram staining, in order to determine the presence of microorganisms in the eye. Each patient signed a consent form. Information regarding age, gender, disinfectant utilized, results of gram staining and culture were all collected in a data sheet. Data were transferred and tabulated using Microsoft Excel. Statistical calculation was obtained using statistic calc of Epi-info package. Chi square test.

RESULTS

Cultures from all three groups of tonometer prisms utilized on each group of patients were negative for micro-organisms (100%). Isopropyl alcohol 70% is as efficient as sodium hypochlorite in eliminating germs (p < 0.05). Fifty percent of our patients were males. Mean age of our patients was 37. Seventy-five percent of our patients (95%) were sterile, free of micro-organisms. Gram positive bacteria were recovered from 4 eyes (3%).

DISCUSSION

To our knowledge, this study is the first...
one designed to perform in a clinical setting. Most of the reports regarding tonometer disinfection are in-vitro studies. Our results show no statistical significance ($p < 0.05$) in the efficacy of isopropyl alcohol 70% versus sodium hypochlorite in tonometer prism disinfection for clinical setting. Several inferences can be drawn from our results. Perhaps, the majority of our patients have eyes free of germs (95%). Or, there is not enough micro-organism load for infectious potential. From these results, the disinfection of tonometer prisms might not be necessary in healthy eyes. However, for prophylactic reasons, the use of isopropyl alcohol 70% or sodium hypochlorite is recommended. We believe that the results from this study could be complemented if a future study included viral culture methods.
REFERENCES


33. FDA - Cleared Sterilants and high-level disinfectants with general claims for processing reusable medical and dental devices. Noviembre 2003.


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- Fundacion de Ojos de Guatemala, Guatemala.
- Francisco Mendizábal, LPh, Chief of Statistics and Biostatistics department, Universidad de San Carlos, Guatemala City, Guatemala.
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- Julían Saquínux MD, Director of Multidisciplinary Laboratory, and staff of the bacteriology laboratory section, Universidad de San Carlos Medical School, Guatemala City, Guatemala.
- Julio Paz MD, Chief of Glaucoma department, Universidad Nacional de Oftalmología (UNO), Guatemala, Guatemala.
- Amilcar Fajardo, MD.
APABO

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El pasado lunes 9 de julio falleció
Frank M. Polack, MD

Hay quien dice que cuando un ser querido se nos muere, muere también con él un pedazo de nosotros. Este es mi caso.

Frank fue un connotado oftalmólogo. Peruano de origen, emigró a los Estados Unidos para especializarse primero, como oftalmólogo y, posteriormente, como cirujano de córnea. Su formación en Columbia, Nueva York, fue muy completa. Sus destrezas quirúrgicas, su avidez por la investigación y su compromiso con la anatomopatología, hicieron de él un cirujano sobresaliente.

Con este bagaje, emigró a la Universidad de Florida como profesor y jefe del departamento de Córnea. Fue ahí que desarrolló su intensísima actividad científica en prácticamente todos los aspectos relacionados con la patología y la cirugía corneales: biología de la sobrevivencia del injerto corneal; manifestaciones inmunes del rechazo de córnea; técnicas quirúrgicas; instrumental; infecciones oculares; viscoelásticos; anormalidades congénitas; ojo seco y prácticamente todos los aspectos relacionados a la patología de córnea fueron sujetos de escrutinio de investigación en su laboratorio y origen y producto de numerosísimas publicaciones. Sobre algunos de estos temas escribió libros que fueron editados en diferentes idiomas. Fundó y fue el primer editor de la revista Córnea y fue también receptor de la medalla Castroviejo.

Todo eso fue Frank Polack. Pero para mí fue algo más. Frank fue la primera persona que me dio su confianza como médico oftalmólogo. Corría el año de 1979 y el Dr. Herbert Kaufman, Chairman del Departamento de Oftalmología de la Universidad de Florida, emigró a Nueva Orleans. Con él, se fueron los fellows de córnea. Era noviembre y el Departamento quedaba acéfalo, sin el apoyo de los fellows y con una gran cantidad de pacientes por atender. Ante tal necesidad, Frank sustituyó a Kaufman y me contrató como único fellow clínico-quirúrgico. Durante los siguientes 7 meses trabajé con él en forma directa y, posteriormente, llegaron cuatro fellows más. Pero esos primeros siete meses en donde convivi con Polack estrechamente, los recuerdo con gran claridad.

Recuerdo sus largos y delgados dedos y sus elegantes movimientos en el microscopio quirúrgico; su continuidad de tiempos, con cadencia y eficiencia. La cirugía con él tenía un ritmo que la hacía parecer fácil y secuencial. Él me enseñó pasos, tiempos y destrezas escondidas; él me llevó de la mano en mis primeros trasplantes y comentanmos miles de casos. Comí con él cientos de veces; cené con él y su familia decenas de ocasiones; viajamos juntos otras tantas y tuve el honor de impartir con él una docena de cursos. Fue Frank Polack mi profesor, mi guía y mi consejero profesional.

Pero además, fue mi amigo. Patricia, su esposa; sus hijos Frank Jr., Peter y Billy y sus inseparables amigos, los Mc Niece, fueron por largo tiempo mi familia extendida. Nos hicieron sentir, a Mercedes mi esposa y a mí, como parte integral de ellos. Y así pasaron muchos meses, probablemente los mejores de mi vida.
Con la muerte de Frank, la Oftalmología latinoamericana pierde a uno de sus más grandes exponentes: la Córnea internacional, a uno de sus pilares; la familia Polack a un ser entrañable e insustituible, y yo, perdí a un buen amigo y a mi mentor.

Frank siempre me pidió que le hablara de "lo". Nunca pude. Mis razones fundadas en su jerarquía, en la admiración y en la gratitud por su amistad, me lo impidieron. Pero hoy sí lo hago:

Gracias Frank por todo lo que fuiste, por lo que hiciste y por lo que nos dejaste.

Hasta siempre.

Dr. Enrique L. Graue Wiechers
México DF

Entre 1979 y 1980 fui de los últimos Fellows del Dr. Polack antes de él dejar la Jefatura del Servicio de Córnea de la University of Florida e ir a la práctica privada. Enseñó a muchos antes de mí como nuestro último Presidente de la APAO, Dr. Enrique Graue.

Frank Mario Polack nació en Piura, al norte del Perú y se graduó como Médico-Cirujano en la Universidad Nacional Mayor de San Marcos de Lima, Perú. Realizó la Residencia en Oftalmología en el Grasslands Hospital de la New York University Post-Graduate Medical School y su entrenamiento en córnea en el Eye Institute de la Columbia University, también en Nueva York.

Investigador dedicado, son clásicos sus primeros trabajos sobre los queratocitos del huésped reemplazando el injerto. Su esposa, Sra. Patricia, cuenta que en esa época llevó corneos a casa en su Volkswagen para salvarlos de una onda de calor. Describió, antes de ser publicada por otros, la línea de linfocitos en el endotelio como signo de rechazo del transplante. Fui testigo cuando junto al Dr. Tatsuo Yamaguchi, de la Juntendo University del Japón, tomaba las primeras fotos del Healon cubriendo el endotelio. Primer Editor y fundador de la revista Córnea, publicó numerosos trabajos y libros. Recibió la medalla Castrojorge de la Córnea Society en 1988 y fue homenajeado en vida durante el World Córnea Congress V en 2005.

Maravilloso cirujano, se enorgullecía de sus casos con queratoprotesis, algunos con más de 20 años y aún evolucionados por su hijo Peter, oftalmólogo en Ocala, Florida. Todo cirujano que realice un transplante de córnea recordará su genio cuando utilice la pinza doble que inventó. Atendió pacientes enviados de todo el continente, ayudando a muchos alojándolos en su propia casa. Líder y patrono de la comunidad latina local, sus fiestas de año nuevo eran famosas. Excelente pintor, en sus últimos años experimentó con fotografía digital infrarroja y presidió el Club de Fotografía de Gainesville.

Yo nunca conseguí decírtelo simplemente Frank. Me enseñó tantas cosas que son imposibles de mencionar en pocas palabras. Me motivó para hacer la Residencia en Brasil y fue el más influyente oftalmólogo en mi vida después de mi padre fallecido también en julio, 9 años antes. Los extrañaré siempre.

Patricia, Franky, Peter, Billy y nietos, en nombre de tantos oftalmólogos alrededor del mundo que aprendimos técnicas quirúrgicas y ética con su ejemplo de vida, reciben nuestros sentimientos, recuerdos y homenaje a su esposo, padre y maestro.

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