

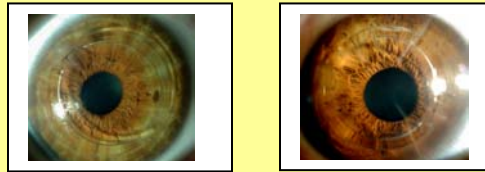
New Technique INTACS® for Keratoconus and Ectasia

Steepest axis incision to control astigmatism and create an aspheric cornea

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PURPOSE

Ectasia: Post surgical (Postlaskik, Postincisional and Unstable Cornea) and Nonsurgical (Keratoconus and Marginal Pellucid Degeneration), has become a prevalent pathology; the treatment choices have become elusive and challenging with the exception of Penetrating Keratoplasty. However, with this new modified technique of INTACS inserts placement for Keratoconus and Keratectasia, we are achieving better refractive outcomes stabilizing the cornea and improving its architecture.



MATERIALS AND METHODS

The surgical technique is based on locating the INTACS inserts on the flattest axis of the refractive error, making the incision on the steepest axis, using 150° arc length Inserts with different sizes (0.250, 0.300, 0.350, 0.400, & 0.450 mm) according to a nomogram designed for this technique using the INTACS Instrumentation (10-Step Prolate System instruments (0.9 mm Corneal Separators, Procedure Marker, Symmetric Glide etc.) from Addition Technology, Inc. (Formerly KeraVision, Inc.)

The surgery was performed on Post surgical Ectasia, Pellucid Marginal Degeneration and Keratoconus patients with mild to severe forms (Stage I, Stage II and Stage III), excluding the patients with Central Corneal Scarring, Hydrops, and Severe Thinning of the cornea (300 microns or less).

A very careful manifest and cycloplegic refraction must be obtained preoperatively. Please keep in mind that is very difficult to refract a Keratoconic patient, and, as such, assessment of the refractive axis must be very accurate as the topographical and keratometric data occasionally do not correlate with one another

Note: Pellucid Marginal Degeneration requires a different nomogram not included in this poster

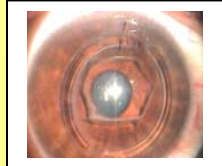
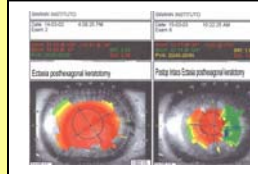
SURGICAL TECHNIQUE:

The surgery is performed under topical anesthesia (preservative free Tetracaine or proparacaine drops). Mark the steepest refractive axis on the cornea and limbus (you can mark it prior to surgery on a Topcon or Haag-Streit Slit lamp using the Slit on that axis or with an axial marker on the operating room). Identify the geometric center of the cornea using the 11 mm Zone Marker, and mark the center using a Sinskey hook. Use the Procedure Marker, placing the incision on the steepest axis of the refraction, away from the thinnest area of the cornea or the conus. perform a 70% corneal thickness (diamond knife setting should be based on pachymetry measurement at the incision site). Set a 15-degree arcuate diamond knife to 70% of the corneal thickness and create a 1.2 mm radial incision. Initiate the dissection of intrastromal tunnel using the Pocketing Hook. Introduce the Symmetric Glide into the incision and initiate the dissection of the tunnel in the clockwise and counterclockwise directions. Place the Vacuum Centering Guide along with the Procedure Marker on the corneal surface. Align the VCG and Procedure Marker with the geometric center; initiate the vacuum on the low setting (450 mBar) and ramp up to the high vacuum setting (630 mBar). Remove the Procedure Marker place clockwise (CW) and counterclockwise (CCW) 0.9 mm dissectors into the Vacuum Centering Guide and create intrastromal tunnels in both the CW and CCW directions. Turn off the vacuum system, remove the VCG, and place the INTACS inserts selected (according to nomogram) on both sides, approximate the incision edges using a 10-0 or 11-0 nylon suture and bury the knot. A plastic shield is then applied and antibiotic/steroid and NSAID drops are prescribed.

Keratoconus, Post-Hexagonal, Post RK and AK Ectasias and Postincisional Unstable Cornea.

- ◆ **NOMOGRAM**
- ◆ **Spherical Equivalent**
- ◆ **+1.00 a -2.00**
- ◆ **-2.00 a -3.00**
- ◆ **-3.00 a -4.00**
- ◆ **-4.00 a -5.00**
- ◆ **-5.00 and higher**
- ◆ **Steepest refractive axis incision technique spherical equivalent cycloplegic refraction**
- ◆ **On thicker corneas > 500 microns use the next thicker segment on the nomogram**

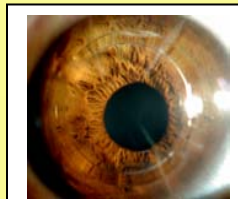
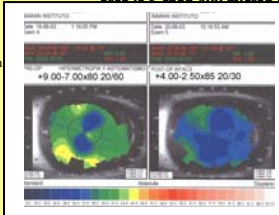
Intacs
250 microns
300 microns
350 microns
400 microns
450 microns



POSTLASKIK KERATECTASIA NOMOGRAM

Intacs	Spherical Equiv	Correction range
+0.25 mm	-1.70 D	-1.625 a -1.175 D
+0.25 mm	-2.00 D	-1.875 a -2.125 D
+0.275 mm	-2.30 D	-2.25 a -2.50 D
+0.30 mm	-2.70 D	-2.625 a -3.00 D
+0.325 mm	-3.00 D	-3.125 a -3.25 D
+0.35 mm	-3.40 D	-3.375 a -3.50 D
+0.375 mm	-3.70 D	-3.625 a -3.85 D
+0.40 mm	-4.10 D	-3.90 a -4.50 D
+0.45 mm	-4.50 D	-4.50 and higher

- ◆ **Always suture the incision, however, when there is only a spherical error do not tighten**
- ◆ **This nomogram is based on Spherical equivalent Cycloplegic Refraction, when pachymetry on the thinnest area is less than 400 microns use the next thickest segment**



RESULTS

A total of 118 surgeries were performed with this technique the longest follow up was 11 months and the shortest was 1 month. Keratoconus Patients Uncorrected Visual Acuity improved to 20/40 or better in 100% of the mild cases and 55% in the moderate to severe cases. Uncorrected visual acuity improved to 20/20 or better in 62% of the mild cases and 20% of the moderate to severe cases. BSCVA improved to 20/30 or better in 100% of the mild cases, 90% of the moderate cases and 62% of the severe cases. One hundred percent (100%) of the patients gained (1 or more) lines of vision while 70% of the severe cases gained 3 or more lines of vision. Stage III keratoconic patients appeared to be the group that benefited most from the procedure, however 100% of the patients experienced improved visual function.

The improvement on the topographical maps were quite remarkable demonstrating a normalizing effect on the corneal surface in 90% of the mild cases and flattening the curvature and displacing the cone centrally on 100% of the cases.

On Surgical Ectasia Patients the cornea stabilize on 100% of the cases, the refractive results were variable since we included all types of Surgical ectasia, the more normalizing effect was on Postlaskik Ectasia Patients.

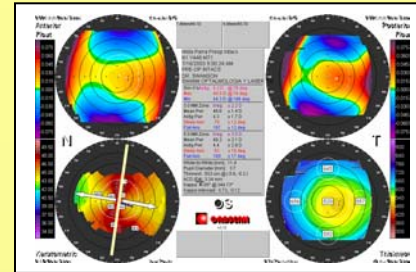
Some of the patients (60%) required some type of refractive correction, and were easily fit with soft contact lenses or spectacles, being able to perform with this type of correction as a normal ametropic patient.

MECHANISM OF CORRECTION

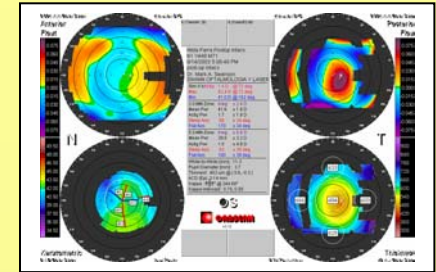
INTACS inserts exert forces on opposite sides of the conus, displacing the thinnest area toward the center and thereby creating a more regular and smooth corneal surface reducing or eliminating the aberrations and the refractive error. The resulting effect provides markedly improved quality of vision and helps to reduce or eliminate monocular diplopia symptoms sometimes observed with horizontal placement of the INTACS inserts. The mechanism correction also relies on the individual strength of the cornea to allow the mechanical forces to act on the cornea and produce the desired effect. On post surgical Ectasia the stabilizing effect on the cornea is the most important mechanism.

The cornea has different variables on different Ectasias and there are several stages and types of Keratoconus including Pellucid Marginal Degeneration, this method allow us to individualize the treatment options for all types of Ectasia.

Mechanical Forces Acting on the Cornea



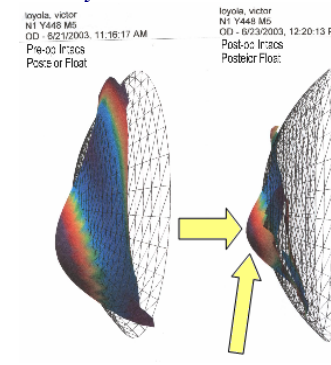
Results



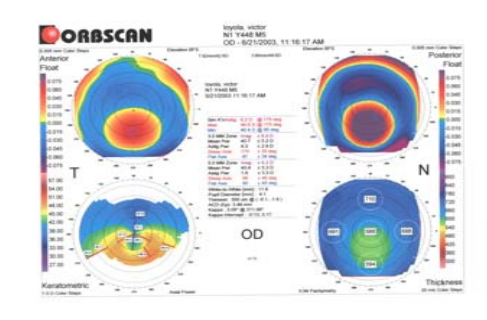
CONCLUSION

This new technique placement changes the architecture of the cornea to a more prolate aspheric shape, decreasing or eliminating aberrations and the refractive error, stabilize and adds rigidity to the cornea, creating a better optical surface thereby improving both the quality of vision and the quality of life of these patients.

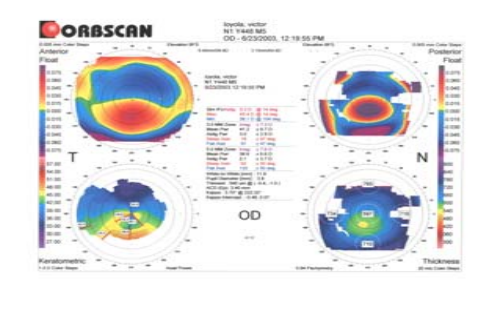
Intacs Exerting Forces on the cone aplanating and displacing it centrally



Pellucid Marginal Degeneration Preop UCVA : CF RX: -7.00-6.00x60 20/50



Pellucid Marginal Degeneration Postop UCVA 20/60 RX -1.00-2.50x60 20/30



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