

**EXPERIENCE OF KERATOCONUS TREATMENT WITH INTRASTROMAL RINGS VEJARANO
CORNEALRING WITH VACUUM DISSECTOR WITHOUT CONSOLE, FOLLOWED A YEAR.**

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SUMMARY

Experience of keratoconus treatment with intrastromal rings Vejarano CornealRing with vacuum dissector without console, followed a year.

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Purpose: To describe the clinical and surgical experience in 51 eyes of 30 patients with keratoconus treated with implantation of intrastromal rings CornealRing (Visiotech® Technology) with the vacuum dissector Vejarano without console.

Location: Vejarano Laser Vision Center, Metepec, Mexico State, Mexico.

Results: 30 patients, 51 eyes were implanted with intrastromal segments CornealRing Vejarano vacuum dissector without console, there were no intraoperative complications. Patients showed significant decrease in keratometry values mean ($49.29 \pm 45.41 \pm 4.81$ diopters preoperative against 3.52 in the post-quirúrtico $p < 0.004$), there was an improvement in visual acuity in 96.08% (49 eyes), with improved refraction measured values especially in the area with average improvement of 4.60 diopters (range 1.00 to 11.00 diopters). There were no postoperative complications the segments as implant extrusion runout neovascularization or implants, except one patient (1 eye, 1.96%) who presented nighttime glare.

Conclusions: CornealRing intrastromal segments with vacuum dissector Vejarano without console, are an effective treatment in the management of keratoconus, improve myopia and astigmatism, keratometry values decrease significantly, often preserving and improving visual acuity without correction. The vacuum dissector Vejarano without console is a safe, reproducible and economical to implement intracorneal segments without resorting to Femtosegundo laser to create the tunnels.

Experience of treatment of keratoconus with intrastromal rings Vejarano CornealRing with vacuum dissector without console, followed a year.

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INTRODUCTION

Keratoconus is a degenerative disease of idiopathic, in which the cornea has a progressive thinning and distortion (cone) resulting in blurred vision secondary to irregular astigmatism, myopia and leucoma¹ formation. This is a progressive disorder that affects both eyes, but only one can be affected initially^{2,3}.

The management of patients with keratoconus focuses on visual rehabilitation, because their vision is compromised by a significant increase in all corneal aberrations⁴. Contact lenses or surgical solutions are needed to improve vision in patients, remain rigid lenses and contact lenses hybrid which produces better quality of vision, however, some can not adapt to the use thereof or do not achieve adequate visual quality⁴, which requires the use of other options surgically.

Corneal intrastromal segments, is a technique which relies on the insertion of polimetilmetracrilato semicircular rings (PMMA) in the cornea with the aim of obtaining a flattening station⁵, decrease irregular astigmatism and improve visual acuity⁶, which ultimately manage to delay or prevent the need for keratoplasty^{5,6,12,15}.

Currently there are four types of intrastromal segments such as Intacs (Addition Technologies, Fremont, CA)^{10,15,18}, the Keraring, originally designed by Paul Ferrara (Mediphacos, Belo Horizonte, Brazil)^{5,6,9,11} the CornealRing (Visiotech[®], Belo Horizonte, Brazil)^{12,13} and KERATACx Plus (Imperial Medical Technologies Inc).

CornealRing segments have a more rounded shape that Keraring predecessor are made of polymethylmethacrylate (PMMA) have an internal diameter of 4.7 mm and 5.9 mm external. Have a length of arc of 155 ° (standard segment) and 220 ° (in case of small or zero astigmatism), the thicknesses are in increments of 50 microns, starting from 150 to 350 micras¹².

The aim of our study is to describe, evaluate and compare the clinical and surgical patients implanted with intrastromal rings CornealRing Vejarano dissector vacuum without console for management of keratoconus.

MATERIALS AND METHODS

A retrospective study descriptive, observational case series comprised by 51 eyes of 30 patients with keratoconus who were implanted with intrastromal segments CornealRing (Visiotech® Technology) with the vacuum dissector Vejarano without console, in Laser Vision Center Vejarano Institute, between January 2008 and May 2009.

Tests Pre and Post-operative

In all patients before the procedure was performed automated and subjective refraction, corneal topography and pachymetry (Pentacam HR®, OCULUS Optikgeraete GmbH). With these results, each of the patients was examined under slit lamp and dilated fundus low. In patients with a history of contact lens wear, patients had a minimum rest period of 8 days (for soft lenses) and 15 days (for hard lenses) calendar prior to taking action. These same measures are taken after the sixth and twelfth month postoperatively.

Patients were excluded, with presence of central corneal opacity, glaucoma presence or previous refractive surgical procedures or posterior segment queratometrias > dp 71.00 (steepest axis), hydrops cornealis, pachymetry less than 300 microns in the creation of tunnel, as well as those who have tracing to 6 months.

Surgical Technique

To calculate the number of segments to implement, thickness and arch of the same, using the nomogram that provides the page www.cornealring.com, taking into account the "lecho estromal residual" should be greater than or equal to the thickness of segment to be implemented, as in cases of implant 220° segments, the incision is 30° away from the steepest axis. For cases that do not meet the thickness ratio of the segment with "lecho estromal residual" thickness, values are adjusted according to the maximum allowed by the residual stromal bed and if segments of different thickness in the same eye when the thickness decreases to implant is changed in proportion to the value of both segments segment thickness to implement⁶.

Marking is made by topography steepest axis (axis of incision) and the visual axis, then becomes arcs of 5 and 6 mm with marker. Subsequently, an incision of 0.8 mm in length between the two arcs level incision shaft, with a depth of 75% of the thickness calculated from the thinnest point of the cornea in the ring of 5 mm, according to the pachymetric map Pentacam (Pentacam HR®, OCULUS Optikgeraete GmbH). After predelaminar and create pockets for tunneling, with vacuum dissector Vejarano without console, proceed to create or tunnel (s) as appropriate. Finally, we proceed to introduce the (the) segment (s), place a point

with Nylon 10/0 and left contact lens. The contact lens is removed at 8 days and the suture at 15 days of surgery.

The postoperative medication was 0.3% Moxifloxacin drops every 4 hours for 10 days, Tobramycin - Dexamethasone drops every 4 hours for a week, Kerotorolaco drops every 6 hrs for a week, 0.1% olopatadine drops every 12 hrs for ocular lubricant three months and in every 2 hrs for 3 months.

RESULTS:

It achieved a total of 30 patients (51 eyes), 21 (70%) patients underwent implantation in both eyes, 9 (30%) patients the implant was in one eye. In cases of bilateral implants, the implant is made the same day. There were no intraoperative complications. Preoperative data of patients operated, are summarized in Table No. 1.

Table No. 2 shows the changes obtained after the sixth month of implants, evidenced improvement in uncorrected visual acuity in 96.08% (49 eyes), only one patient did not improve visual acuity in both eyes for having myopia superimposed but improved its spherical equivalent refraction and significantly, a situation that occurred in all patients in this report, see Figure No. 1.

In all patients corneal flattening is observed after implantation of the segment, value that is reflected in changes in keratometrias always decreased even flatter axis, with a significant decrease in the mean keratometry values (49.29 ± 4.81 dioptrías presurgical against 45.41 ± 3.52 in the post-quirúrtico $p < 0.004$) (See Figure No. 2).

The average depth of implantation of the segments was 371 ± 25.21 microns (range 300-420 microns). No postoperative complications recorded by the implant of the segments as extrusion, neovascularization or runout of implants implanted with Vejarano dissector vacuum without console. Only one patient (1 eye, 1.96%) reported nighttime glare present.

CONCLUSIONS

Like other types of intrastromal segments, the CornealRing, is effective and safe in the treatment of keratoconus to improve myopia and astigmatism, and in some cases improving visual acuity as well without correction or with correction situation observed in other studies reported in the literature with other intrastromal segments.^{3-15,18}

Intrastromal segments CornealRing lower the astigmatism and the field, especially the latter value is the one that shows changes given the flattening effect of inducing segments, improving on average 4.60 diopters (range 1.00 to 11.00 diopters). The most significant findings were observed steadily with decreased keratometry values in both the flat and curved lines as keratometry average situation was observed in the corneal topography (Figure No. 1). The uncorrected

visual acuity improved significantly in patients with single segment implantation, which corroborates the literature 3-15, that the simple corneal flattening improves , the corneal aberrations and the sphere, manifesting an improved visual acuity, the nomogram provides the manufacturer's website provides results very similar and sometimes better than those reported in the literature.³⁻¹².

There were no intraoperative complications with the use of vacuum dissector Vejarano without console as perforation or offset (see Figures 2 and 3). In the postoperative period, only one patient presented with night glare that was managed with brimonidine 0.2% instilled once daily at 18.00 hrs, although it can handle eyeglasses with yellow filter with very good results⁶. We also found that the vacuum Vejarano dissector without console provides an adequate tunneling unrecorded cases runout segments, becoming a safe and reproducible tool for the implantation of the segments, including curved corneas (Figure 1), thin and elastic.

We always recommend that institution, plus implantation of intrastromal segments, performing Corneal Crosslinking with Riboflavin UV A and to strengthen córnea^{16, 17} and guarantee excellent results provided by these long-term intrastromal segments. New long-term studies are required to demonstrate over time the findings and recommendations regarding.

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Table No. 1. Characteristics of patients studied		
	Media ± DE	Rank
Age (Años)	29.37 ± 9.5	13 – 43
Sex M/F	17 / 13	NA
Refraction (D)		
Sphere	-8.05 ± 6.33	-27.50 a +1.00
cylinder	-4.31 ± 2.13	-8.00 a -0.50

D = diopters, SD = standard deviation. M / F = Male / Female. NA. not Applicable

Table No. 2. Parameters pre-and post-surgical				
Presurgical	Presurgical		Post-Surgical 6th month	
	Media ± DE	Rank	Media ± DE	Rank
Sphere	-8.05 ± 6.33	-27.50 a +1.00	-3.45 ± 4.26	-16.00 a +1.75
Astigmatism	-4.31 ± 2.13	-8.00 a -0.50	-3.69 ± 1.66	-8.5 a -1.5
EE	-10.20 ± 6.84	-29.50 a -0.50	-5.30 ± 4.41	-16.97 a +0.37
Keratometry steep axis	51.30 ± 5.59	43.20 a 67.00	47.16 ± 4.33	42.70 a 56.10
Axis flatter keratometry	47.29 ± 4.17	41.00 a 57.80	43.66 ± 3.64	37.40 – 51.00
keratometry Media	49.29 ± 4.81	42.10 a 62.40	45.41 ± 3.52	41.75 – 53.55
AV SC	1.26 ± 0.51	0.18 a 2.00	0.68 ± 0.42	0.1 – 2.00
AV CC	0.40 ± 0.27	0.00 a 0.88	0.31 ± 0.18	0 – 0.4

SD = standard deviation. SE = spherical equivalent. VA = visual acuity (logMAR units). NC = No Correction. CC = with correction. The EE Securities and keratometry are given in diopters.

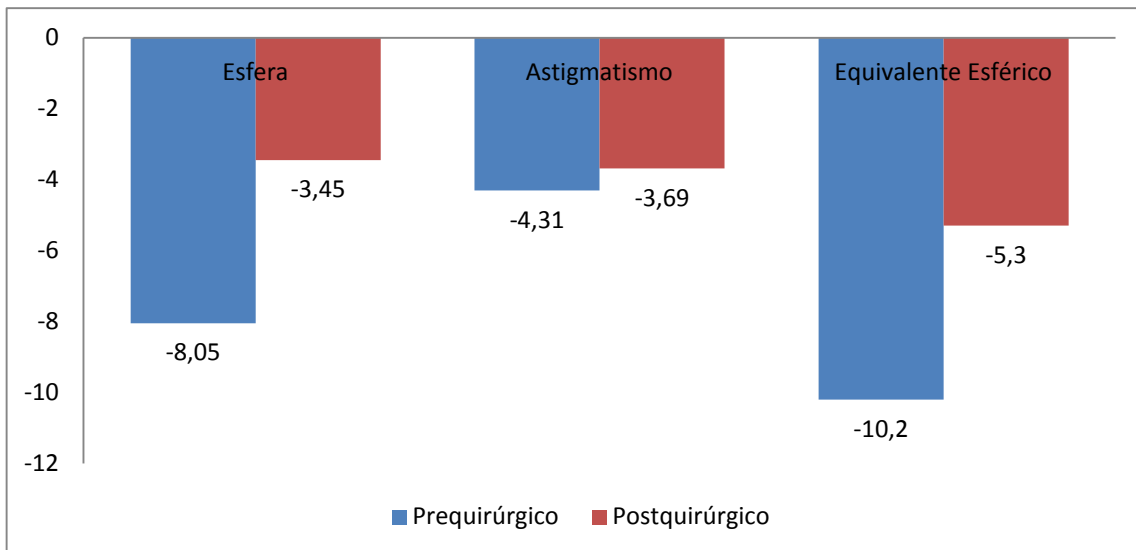


Chart No. 1. Behaviour of pre and postoperative refraction.

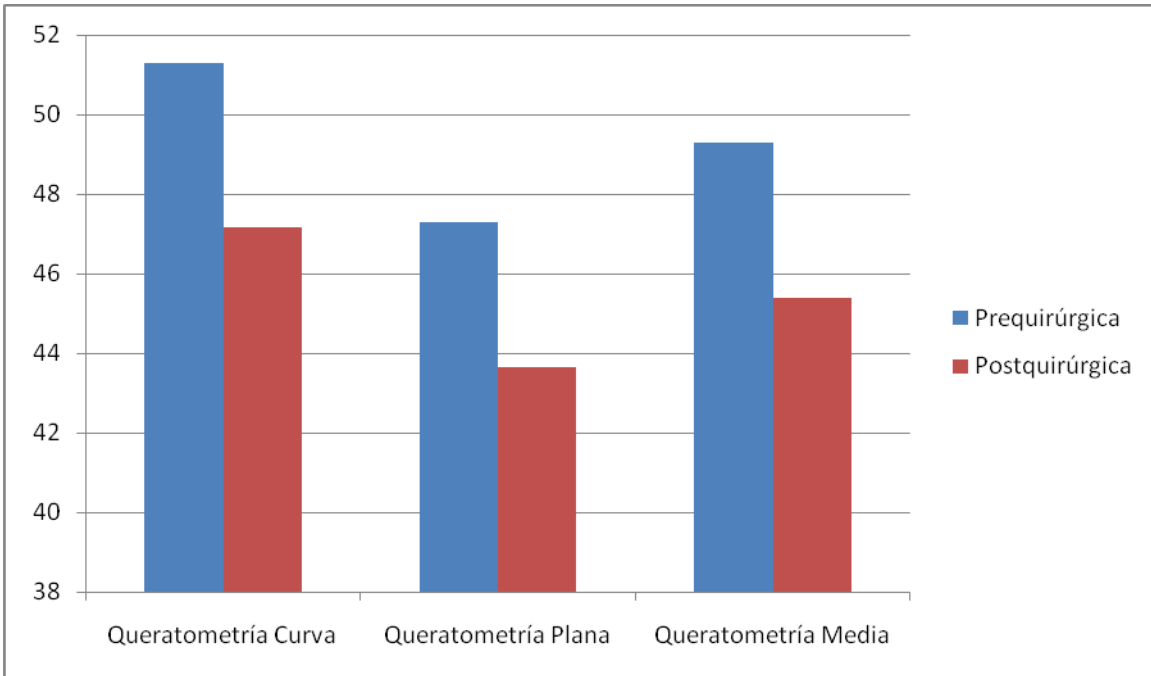


Figure No. 2. Behavior pre Keratometry values and postquirúrgicos.

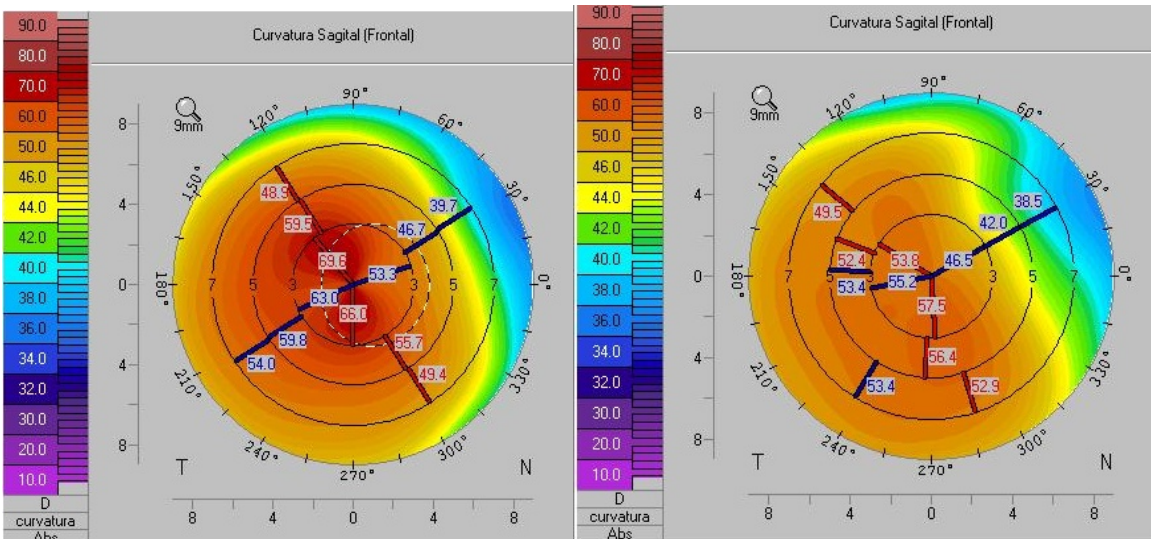


Figure No. 1. Topographic changes pre-and post-surgical. Note steeper preoperative keratometry and change with the introduction of two segments.

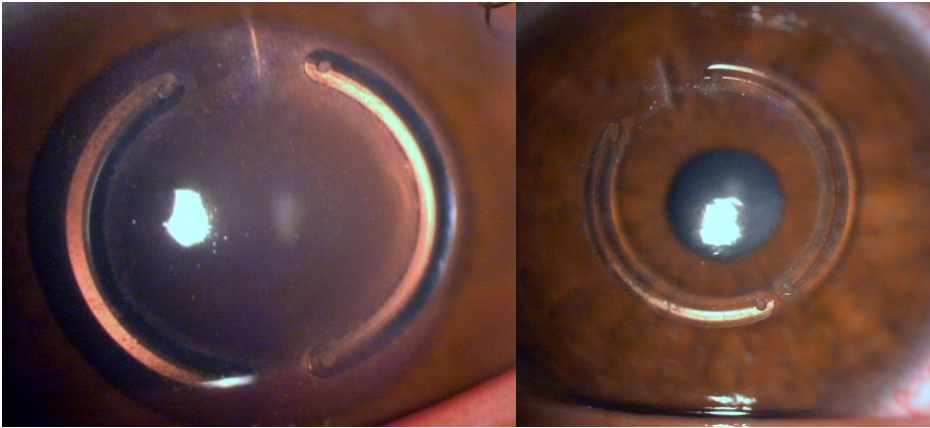


Figure # 2. Segments Vejarano implanted with vacuum dissector without console.

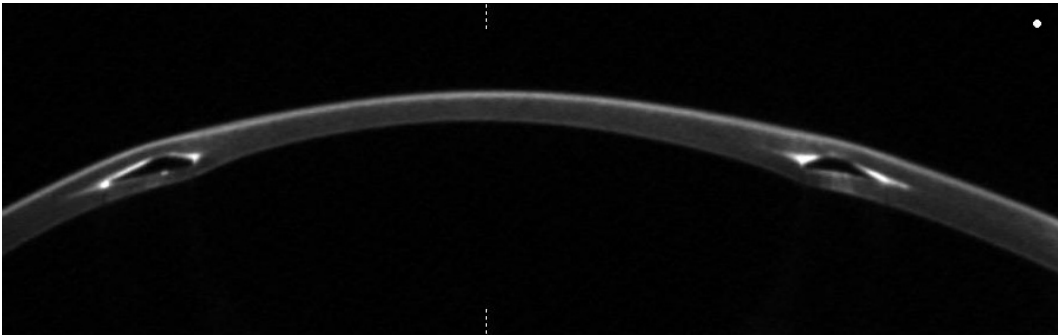


Figure No. 3. Image Scheimpflug Pentacam[®] by implanted segments.