FROM BOWTIE TO CASUAL: DEALING WITH TORIC CORNEAS IN ORTHO-K

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Disclosure

-Financial interest in:
  - **DRL® System** (Double Reservoir Lens) for Ortho-k.
  - **Amiopik GP&Soft** lenses for myopia control.

-Financial relationship with the companies:
  - **Paunevision**
  - **Precilens**
  - **UCO**
  - Seminars for Ciba Vision, Precilens and Topcon.

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“Approximately one third of potential contact lens wearers require astigmatic correction” (Young, 2011)


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Astigmatism & Myopia control

Axial Length
6 m  61%
12 m  58%
18 m  53%
24 m  52%

Toric Ortho-k arrives in 2005

Short and long term success with correction of high astigmatism in OK

Michael Baertschi, M.S.Optom., M.Med.Educ., FAAO


CASE REPORT

Correction of high amounts of astigmatism through orthokeratology. A case report

Michael Baertschi*, Michael Wyss

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A toric cornea has a different sagitta

A spherical lens doesn’t land properly on steep meridian

Image courtesy of Dr Gonzalo Carracedo (Spain)
Toric lens design

Different elevation on periphery

Image courtesy of Dr Gonzalo Carracedo (Spain)
In toric surfaces elevation is key

Image courtesy of Dr Gonzalo Carracedo (Spain)
Efficacy of toric Ortho-k

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Our retrospective study

- 32 patients with refractive astigmatism greater than 1.25D with any orientation axis.
- Mean $-2.18 \pm 1.36$ (-1.25 to -6.50)
- We used only right eye.
- Ages between 26 and 35.
- Fitted with a Toric Double Reservoir Lens (DRL).

**ARTICLE**

Toric Double Tear Reservoir Contact Lens in Orthokeratology for Astigmatism

Jaume Pauné, M.Sc., Genis Cardona, Ph.D., and Lluïsa Quevedo, Ph.D.

Paune J. Toric Double Tear Reservoir Contact Lens in Orthokeratology for Astigmatism. Eye & Contact Lens 2012;38: 245–251
Results

- Sphere, changed of $-2.05 \pm 1.46$ D, accounting for a change of 106% of the initial refractive error.
- Cylinder, changed of $-1.80 \pm 1.06$ D, accounting for a change of 85% of the initial astigmatism and resulting in a mean residual astigmatic error of $-0.38 \pm 0.41$ D.
- A strong, positive correlation was encountered between baseline and residual refractive cylinders ($\rho = 0.724; p < 0.001$)
- Residual Cylinder $= 0.24 \times$ Baseline Cylinder $+ 0.15$
Clasification
A (Paune) classification for astigmatism

- **(Apical)** Central Astigmatism bigger than peripheral
- **(Limbus to limbus)** Central Astigmatism equal to the peripheral
- **(Limbal)** Peripheral Astigmatism bigger than central
Apical; Central Astigmatism > peripheral

Excentricity Flat < Steep
Peripheral:
Central Astigmatism = peripheral

Excentricity Flat > Steep
Limbus to Limbus:
Central Astigmatism < peripheral
Design of a toric ortho-k
In one meridian we should correct myopia.

On the other hand, the myopia and astigmatism.
Desing of the contact lenses

When:

- **Central** Astigmatism is **bigger** than **peripheral** we use **spherical** lens over \(-1,75 \text{ D. cyl}\).
- **Central** Astigmatism is **equal** to the **peripheral**: Use **toric** lens over \(-1,25 \text{ D. cyl}\)
- **Central** Astigmatism is **smaller** than **peripheral** use **toric** lens over \(-1,00. \text{ D.}\)
Fitting system: Trial Set

Optimization is done from:
- Fluorescein pattern
- Fitting is Controlled with topography.
How we calculate a toric lens for ortho-κ²
Fitting system from Topography data: Empirical Ortho-k Fitting

From keratometry, eccentricity and refraction.

- RGP Designer (J Toffoli)
- DRL-System (J Paune)
- OrthoTool (E Chow)
Fitting with Topography Software: Ortho-k Lenses Design

- Topographic data based
  - Wave (J Edwards)
  - EyeSpace (L Scott-Hoy)
Example of a toric ortho-k
Example of peripheral: Central< peripheral

Rx OS; -0.75-2.75@170 VA; 1.2
Keratometry; 8,41 (40,13) @169° x 7,91 (42,67)
Central ACA 2,20 D. / Peripheral ACA 2,51
Flat ecc 0,47 / Steep ecc 0,31
Example Peripheral: Central < peripheral

Overnight test: Spherical lens

Results;
Rx 0.00 – 1.25*0
AV 0.5
DRL Toric lens:
K 8.40 x 7.95 M 1.00 C 2.75 P 8.40 x 7.85 DT 10.80

Result Rx: 0.00 -1.00*0°
Example Peripheral Central<peripheral

DRL Bitoric lens (BOZ toric / RC toric / Alignent toric)
K 8.45 x 7.80 M 1.00 C 3.25 P 8.45 x 7.80 DT 10.80

Result Rx; +0.25 -0.50*0
Example Limbus to limbus:
- 4.00 D pure cyl with the rule
Example IV: Oblique
OD -1.75 -2.75*65
OI -1.25 -3.25*110
Clinical pearl: Rotational check
Toric Ortho-k limits?

- Astigmatism up to -6.00 D.
- Any axis.
- Different corneal power and refractive cyl.
- Mixed Astigmatism
The Future

- I believe Myopia management will be a must.
- Orthokeratology is the best currently way.

Are you ready to help
The 70% of the child, or the 100%?
Any question? Maybe I have a answer

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