TransPRK
PAST, PRESENT, FUTURE

Soheil Adib-Moghaddam, MD
Trans-PRK Research Group, Tehran, Iran - Universal Council of Ophthalmology, USERN, Tehran, Iran

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TRANSPRK EVOLUTION AT A GLANCE

- Two-step: PTK + PRK (1990+)
PAST: BEFORE WE STARTED
1. Comparison of Mechanical and Transepithelial Debridement during Photorefractive Keratectomy (Clinch TE et al. 1999; Ophthalmology)


COMPARISON OF MECHANICAL AND TRANSEPIHELIAL DEBRIDEMENT DURING PHOTOREFRACTIVE KERATECTOMY

The 1st prospective evidence about two-step TransPRK: PTK + PRK

• **Purpose**: Comparison of clinical results from mechanical and transepithelial debridement during photorefractive keratectomy

• **Conclusion**:
  - Clinical results were not statistically different between the two techniques
  - Mechanical technique tended to have superior values for almost all tested parameters

Clinch TE et al. 1999; Ophthalmology
TRANSEPIHELIAL PHOTOREFRACTIVE KERATECTOMY: CLINICAL RESULTS

The 1st clinical study on Single-step TransPRK

- **Purpose:** To assess the effectiveness, safety, and comfort of transepithelial photorefractive keratectomy (PRK) using the Amaris laser platform.
- **Conclusion:** Transepithelial PRK for mild to moderate myopia with or without astigmatism was
  - Safe
  - Easier to perform than conventional PRK
  - Less pain
  - Less postoperative haze
  - A faster healing time
  - The visual outcomes with the 2 techniques were comparable.

WHAT WE KNEW ABOUT SINGLE-STEP TRANSPRK BEFORE WE STARTED

- Almost comparable visual outcomes compared to other surgical modalities.
- Faster procedure
- Faster epithelial healing
- Less pain
- Less haze
Section II

TRANSPRK RESEARCH GROUP; NOW A PART OF: UNIVERSAL COUNCIL OF OPHTHALMOLOGY (UCO-USERN)
CURRENT ORGANIZATION

Established in 2010

Ioannis Pallikaris
Advisor

Samuel Arba Mosquera
Supervisor

Harilaos Ginis
Supervisor

Soheil Adib-Moghaddam
Founder

Saeed Soleyman-Jahi
Managing Director
OUR PUBLICATIONS AT A GLANCE

- 25 total scholarly publications
- 4 papers published
  - 4 other under review
- 21 abstract presentations
  - AAO
  - ESCRs
  - ASCRS
  - WOC
  - ISRS

![Number of Publications Chart]

2011: 1
2012: 2
2013: 3
2014: 6
2015: 4
2016: 4
2017: 5
SCIENTIFIC CONTRIBUTION HIGHLIGHTS

• Preliminary introduction of:
  • *Refined Single-step TransPRK*
  • *Iran regimen*

• Publication of the first results of single-step TransPRK in hyperopic eyes.
  • *Bi-central study with Aschaffenburg clinic of Germany*

• Publication of the longest prospective follow-up data results for myopic eyes undergoing single-step TransPRK

• Publication of the first prospective vector analysis results for myopic single-step TransPRK

• Upcoming international multi-center projects
Section II-a: TransPRK Research Group Publications

CONVENTIONAL SINGLE-STEP TRANSPRK
CONVENTIONAL SINGLE-STEP TRANSPRK

1. Transepithelial PRK (T PRK) Mode, Using Schwind Amaris 500 Hz Excimer Laser (Adib-Moghaddam S. ESCRS XXIX, 17-21 September 2011, Vienna, Austria)


3. On line pachymetry outcome of ablation in aberration free mode TransPRK using SCHWIND AMARIS laser (Adib-Moghaddam S. ESCRS XXX, 8-12 September 2012, Milan)


5. Visual, Contrast Sensitivity outcomes and Aberration changes after Trans-PRK in high myopia: A 9-month follow-up study (Adib-Moghaddam S. The annual meeting of ISRS, Refractive Surgery Subspeciality day; April 2013; New Orleans)
CONVENTIONAL SINGLE-STEP TRANSPRK

6. Clinical outcomes of Transepithelial Photorefractive Keratectomy in Myopia 9 month follow up results (Adib-Moghaddam S. ESCRS XXXI, 5-9 October 2013, Amsterdam)


8. Visual, contrast sensitivity outcomes and aberration changes after transepithelial photorefractive keratectomy in high cylindrical refraction: 9 month follow-up results (Adib-Moghaddam S. 18th ESCRS Winter Meeting, 14-16 February 2014, Ljubljana)


CONVENTIONAL SINGLE-STEP TRANSPRK


12. Preoperative Visual Indices and Surgical Parameters That Influence Achieved Visual Acuity after TransPRK (Adib-Moghaddam S. The annual meeting of ISRS, Refractive Surgery Subspecialty day; October 2014; Chicago)

Section II-b: TransPRK Research Group Publications

REFINED SINGLE-STEP TRANSPRK
MODIFICATIONS

- Surgical Parameters
  - Target refraction
  - Optical zone determination
  - Centration approach
  - MMC regimen
- Post-surgical medication
  - Iran regimen
1. Comparison of patients with low and high preoperative corrected distance visual acuity undergoing trans-epithelial photorefractive keratectomy in terms of surgical outcomes (Adib-Moghaddam S. 19th ECRS Winter Meeting, 20-22 February 2014, Istanbul, Turkey)

2. Effect of trans-epithelial photorefractive keratectomy on myopic eyes higher order aberrations and main factors predicting it (Adib-Moghaddam S. ESCRS XXXIII, 5 - 9 Sept. 2015, Fira Gran Via, Barcelona)

3. Eighteen-month follow up results of single-step transepithelial photorefractive keratectomy in myopia in terms of qualitative and quantitative visual outcomes (Adib-Moghaddam S. The ISRS Annual Meeting, Refractive Surgery Subspecialty Day; 2015)

4. Demographic, surgical and preoperative optical indices that are associated with dynamic cyclotorsion correction throughout ablation in Transepithelial Photorefractive keratectomy (Adib-Moghaddam S. World Ophthalmology Congress 2016, Guadalajara, Mexico)

6. Comparison of single-step transepithelial photorefractive keratectomy with or without mitomycin C in mild-moderate myopia (Adib-Moghaddam S. ESCRS XXXIV, 10-14 Sept. 2016, Copenhagen, Denmark)


12. Identification of optimal optical zone to transitional zone ratio in refined single-step transepithelial photorefractive keratectomy; The annual meeting of ISRS, Refractive Surgery Subspecialty day; November 10 2017; New Orleans, USA
TRANSEPITHELIAL PHOTOREFRACTIVE KERATECTOMY FOR HYPEROPIA: A 12-MONTH BICENTRAL STUDY

1st clinical results of hyperopia correction by single-step TransPRK

- **Purpose:** To investigate the safety, efficacy, and stability of transepithelial photorefractive keratectomy (PRK) for hyperopia with or without mild to moderate astigmatism.

- **Conclusion:**

  Single-step transepithelial PRK with the Amaris 500-Hz excimer laser:

  ✓ Conventional method provided reasonable outcomes.

  ✓ Refined method provided promising outcomes
The longest prospective follow-up results ever published

- **Purpose:** To evaluate the long-term quantitative and qualitative optical outcomes of refined single-step transepithelial photorefractive keratectomy (PRK) to correct myopia and astigmatism.

- **Conclusion:**
  
  Refined Trans-PRK in Myopia and Astigmatism correction:
  
  ✓ Is **safe and efficient**.
  
  ✓ Improves **refraction and quality of vision**.
  
  ✓ **Vector analysis** indicated promising results of astigmatism correction by this technique.

Journal of Cataract & Refractive Surgery 42 (11), 1570-1578;2016.
PAPERS UNDER REVISION / REVIEW

• Comparison of single-step trans-epithelial photorefractive keratectomy with or without Mytomycin-C in mild-moderate myopia (Under Revision)

• Age, visual axis, and visual function associate with ocular cyclotorsion in single-step transepithelial photorefractive keratectomy (Under Review)

• Determinant Factors of Quality of Vision after Transepithelial Photorefractive Keratectomy in Myopia (Under Review)

• Predicting Supervision achievement after Transepithelial Photorefractive Keratectomy in Myopia (Under Review)
Section III

OTHER PUBLICATIONS ON-PAR WITH OUR RESULTS
OTHER PUBLICATIONS AT A GLANCE


OTHER PUBLICATIONS AT A GLANCE


WHAT DO WE CURRENTLY KNOW ABOUT SINGLE-STEP TRANSPRK?
TYPE OF REFRACTIVE ERROR

- Promising results in mild-moderate myopia and mixed myopic astigmatism
- Promising results in correction of astigmatism.
- Reasonable results in pure hyperopic or mixed hyperopic astigmatic eyes by conventional single-step TransPRK.
- Promising results in high myopic eyes.
COMPARED TO OTHER MODALITIES

- All-laser assisted
- Faster
- Easier to perform than conventional PRK
- Less pain, less discomfort
- Less postoperative haze
- A faster healing time
COMPARSED TO OTHER MODALITIES

• Comparable CDVA, UDVA, and safety outcomes between transepithelial PRK and alcohol-assisted PRK

• Comparable refractive outcomes to LASIK and PRK, with relatively favorable visual acuity outcomes in SCHWIND t-PRK with Mytomycin C for high myopia

• Single-step TransPRK vs LASEK for high myopia with or without astigmatism:
  • Similar visual, refractive and safety

• Faster Visual rehabilitation, re-epithelialization and less pain in the early post-operative period in Tran-PRK with “smart-pulse-technology” than conventional Trans-PRK
REFINED SINGLE-STEP TRANSPRK: VISUAL ACUITY AND REFRACTION

• High predictability and efficacy in terms of visual acuity and refraction
  • % eyes > 20/25 | mild-moderate myopia: 97% , mild-moderate hyperopia: 95%, high-myopia: 87%
  • ±0.5 D predictability | mild-moderate myopia: 98%, mild-moderate hyperopia:100%, high-myopia: 97%
• In patients with low pre-op CDVA, one-step refined TransPRK could improve CDVA and refraction so that these indices were comparable with high CDVA group after the operation.
• Stable refraction achieved by 3rd postoperative month in myopic correction.
• 1 out of 3 myopic eyes achieve supervision 1 year after operation
• Determinant factors of achieving high supervision (one year after TransPRK):
  • Preoperative higher UDVA, lower astigmatism, better contrast sensitivity
  • Preoperative smaller pupil diameter
  • Less peak laser fluence (J/cm2)
  • Female gender (trend of significance [p=0.08])
REFINED SINGLE-STEP TRANSPRK: QUALITY OF VISION

• Enhances subjective (questionnaire-based) and objective visual quality of patients with various refractive errors
• Improve photopic and mesopic CS in myopic correction with or without astigmatism.
• No clinically significant alterations of HOA
EFFECTS ON QUALITY OF VISION

- Main factors that govern postoperative quality of vision in myopic correction:
REFINED SINGLE-STEP TRANSPRK: OTHER FINDINGS

• Refined Single-Step TransPRK with or without MMC, in correction of myopic eyes with total ablation depths ≤ 160 µm resulted in: Similar Efficacy, Stability and Rate of Haze induction.

• Main factors that govern DCC during ablation:
  • Age
  • Visual axis (kappa locus)
  • UDVA, CDVA, and contrast sensitivity
TECHNICAL FINDINGS

• Optimal OZ / TZ ratio in Refined single-step TransPRK based on postoperative contrast sensitivity results
  • Ratio < 4 resulted in postoperative outcomes comparable to ratio 5-6
  • Ratio >7 as well as ratio 4-5 resulted in better outcomes compared to ratio<4 and 5-6
  • These results were adjusted for positive effect of absolute OZ value on postoperative CS.

• What to consider in applying OZ > 7
  • K (D)
  • CCT (µm)
  • Ratio of CCT to Spherical Equivalent (µm/D)
REFINED SINGLE-STEP TRANSPRK RESULTS HIGHLIGHTS

• Promising results in mild-moderate myopia with or without astigmatism
• Promising vector analysis results for correction of mixed myopic astigmatism
• Promising results in hyperopia with or without astigmatism.
• Improving contrast sensitivity without notable induction of higher order aberrations.
• Supervision achievement (1 out of 3 eyes treated achieves UDVA ≥ 15/10)
• Efficacy and safety of refined TransPRK by AMARIS 500 laser in asymmetric astigmatism correction
• Efficacy and safety of refined TransPRK by AMARIS 500 laser in FFKC
• No need for MMC in mild-moderate myopia correction.
Based on existing evidence provided by literature pooled data:

Better quantity and quality of vision by **Refined** single-step TransPRK compared to other laser-assisted modalities in correction of different refractive errors.
Correcting Myopia
Astigmatism
High myopia
Faster re-epithelialization
Less HAZE
Less PAIN

What does TransPRK provide us currently?
Correcting
Better results for myopia
Better results for astigmatism

HYPEROPIA
Asymmetric astigmatism
FFKC

SuperVISION
Less need for MMC

Improved CS
No HOA induction

What in advance does Refined TransPRK offer?
The only Way to Stop TransPRK Freekick
Nostradamus
Almost 5 years ago, my comment in TransPRK LinkedIn group: It will become a MAINSTREAM…

https://www.linkedin.com/groups/4777984
TREND OF GLOBAL TRANSPRK SHARE IN LASER-ASSISTED REFRACTIVE SURGERY (DATA FROM 10 CENTERS)
1999  First prospective clinical results of two-step TransPRK published

2007  Amaris Launched; single-step TransPRK

2011  First clinical results of single-step TransPRK published

2016  First results of Refined single-step TransPRK published
Section V

FUTURE CHALLENGES AND EXPECTATIONS
CHALLENGING CASES SUBJECT TO FURTHER CONSIDERATIONS

- Achieving higher levels of visual acuity and visual quality
- Thin cornea
- Less ablation profiles
- Post-RK
- Presbyopia eyes
- Forme-Fruste and clinical Keratoconus
- High astigmatism
- High myopic mixed astigmatism
- High hyperopic mixed astigmatism
- Conflict with multifocal lenses implantation
MY SPECIAL GRATITUDE AND APPRECIATION.
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