Characterization of Zig-Zag Femtosecond Laser-Assisted Keratoplasty Wound Configuration Using Anterior Segment OCT

Benjamin B. Bert, MD
Olivia L. Lee, MD

Department of Ophthalmology
Keck School of Medicine
University of Southern California
Los Angeles, CA

ASCRS-ASOA 2008 Symposium & Congress

April 25-29, 2014

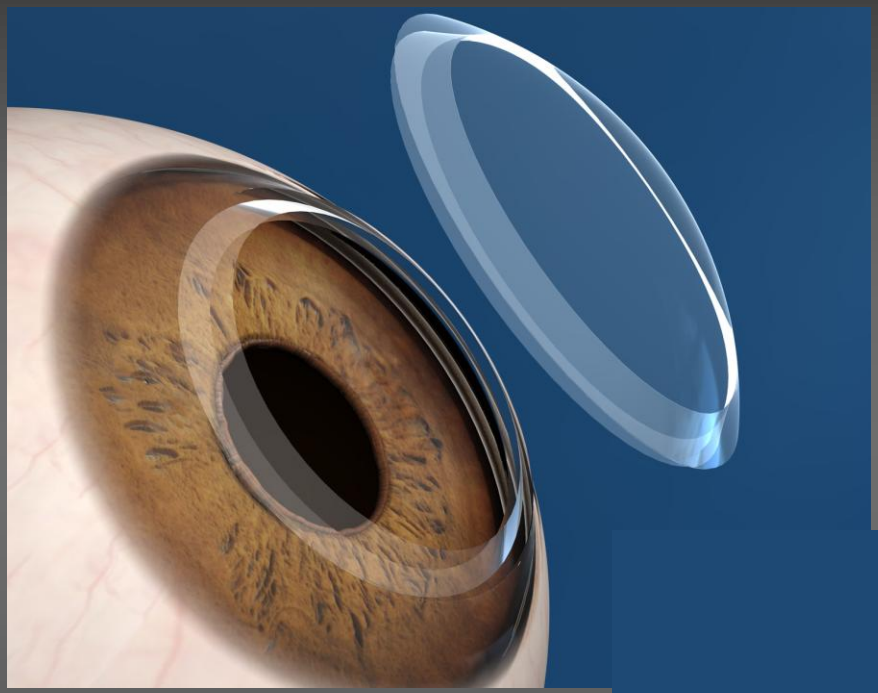
Dr. Bert has no financial interests to disclose.
Dr. Lee serves as a consultant for and receives research funding from Allergan, Inc.

Femtosecond Laser Assisted Keratoplasty

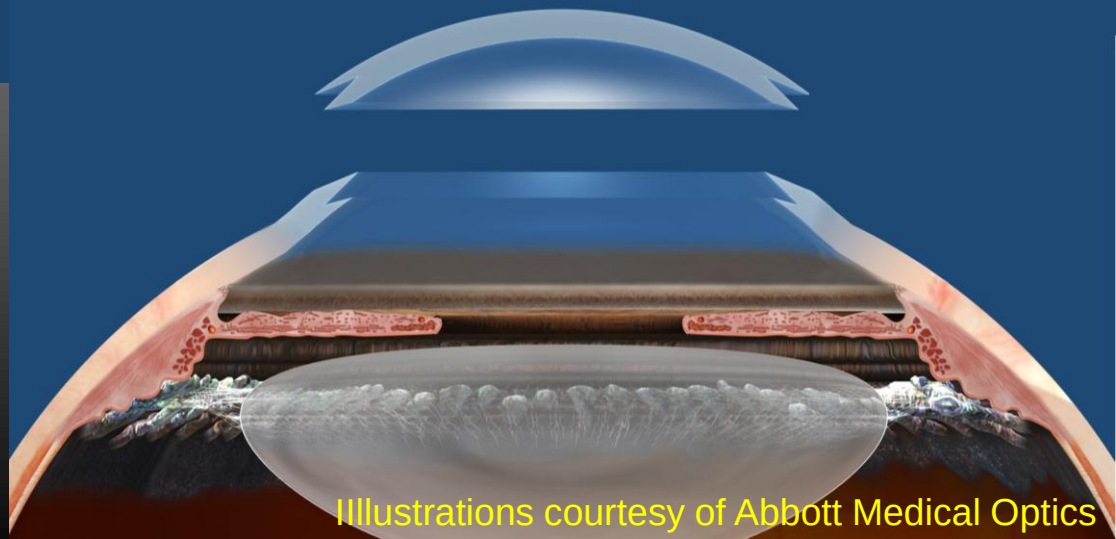
- Femtosecond laser to cut host and donor
  - Uses near-infrared light (1053 nm) to create photodisruption for precise trephination cuts
  - Reproducible and predictable customized trephination patterns to optimize mechanical strength

- Potential benefits:
  - Faster recovery due to faster wound healing
  - Earlier suture removal
  - Lower astigmatism rates during first 6 month
  - Greater wound stability
    - More force required for rupture
    - Less risk of wound dehiscence

ZigZag Trephination Pattern



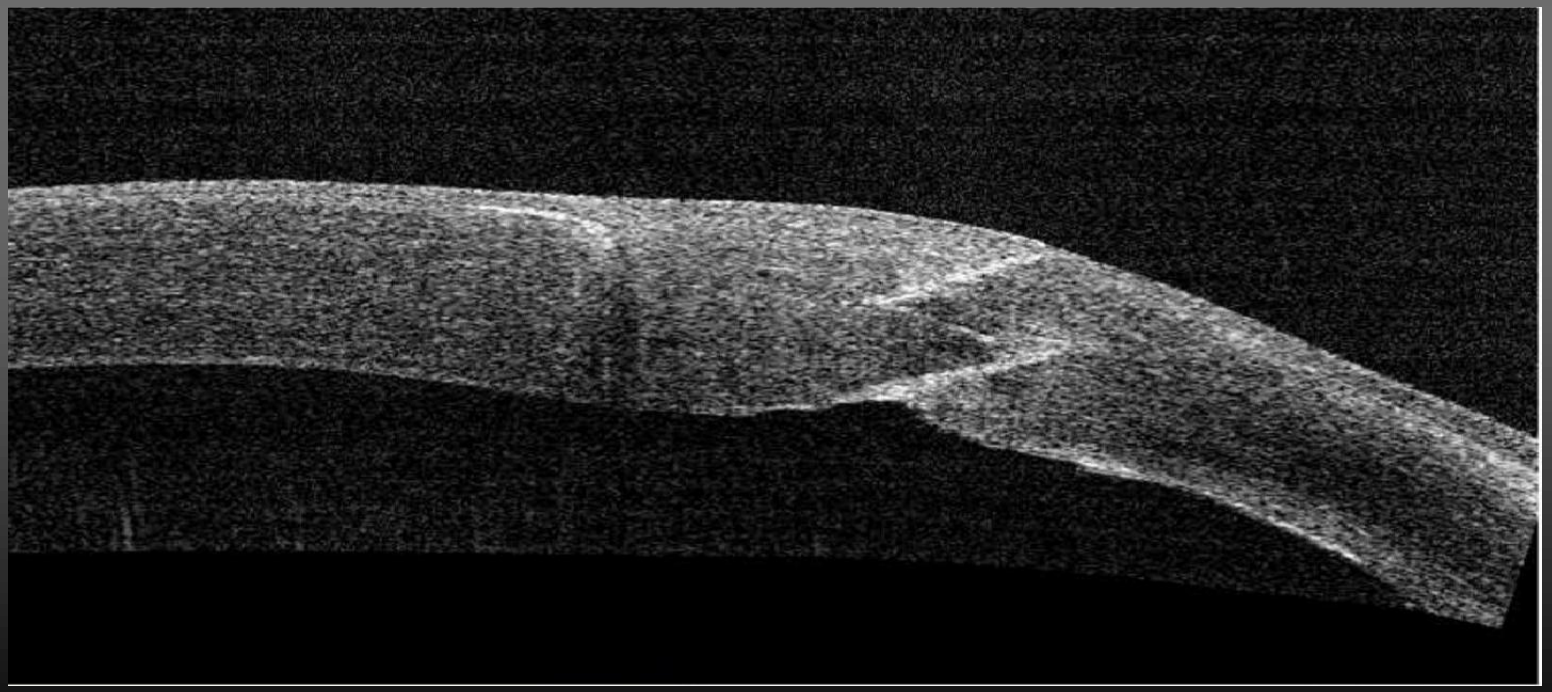
- Naturally hermetic
- Maximizes surface area of graft and host wound contact



IIllustrations courtesy of Abbott Medical Optics

Purpose

- To evaluate wound architecture of FLAK with the ZigZag wound configuration post operatively



Methods

- A retrospective review was performed on eyes that had undergone femtosecond laser assisted trephination using a zig-zag configuration
- All cases from 2012 academic year performed by a single surgeon (OLL) were reviewed
- Anterior segment OCT was performed using Spectralis Anterior Segment Module (Heidelberg Engineering)
- Thickness from epithelial edge to end of internal wound at 8 o'clock position of graft host junction was measured

Results

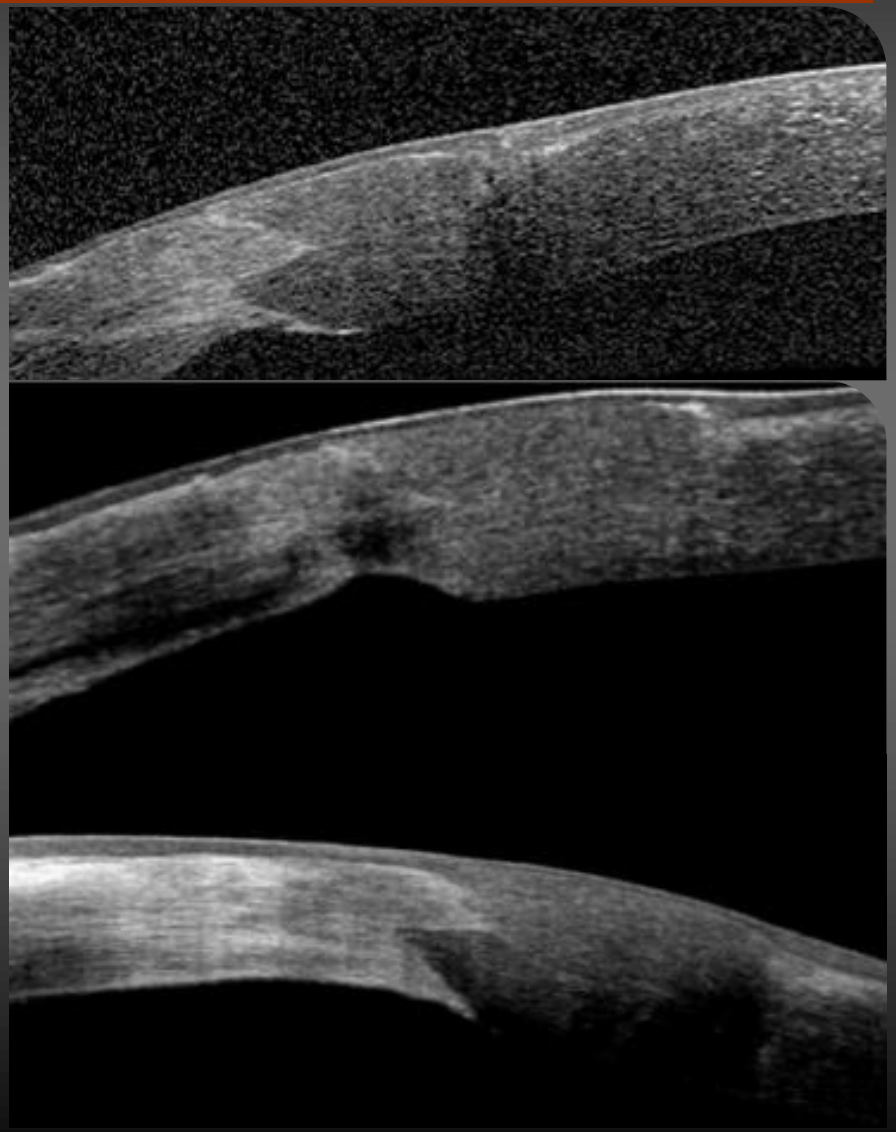
- Six cases were reviewed and 3 cases qualified for analysis due to availability of followup and imaging data
- Two had FLAK performed for keratoconus and one for a corneal opacity secondary to herpes simplex virus (HSV) .
- The zig zag wound configuration could be easily recognized at all time points.
- All three eyes showed contraction of the wound during follow up.

66yo F s/p FLAK for corneal scar

POM #2
678 microns

POM #6
649 microns

POM #9
564 microns



52yo M s/p FLAK for KCN

POM #3
645 microns

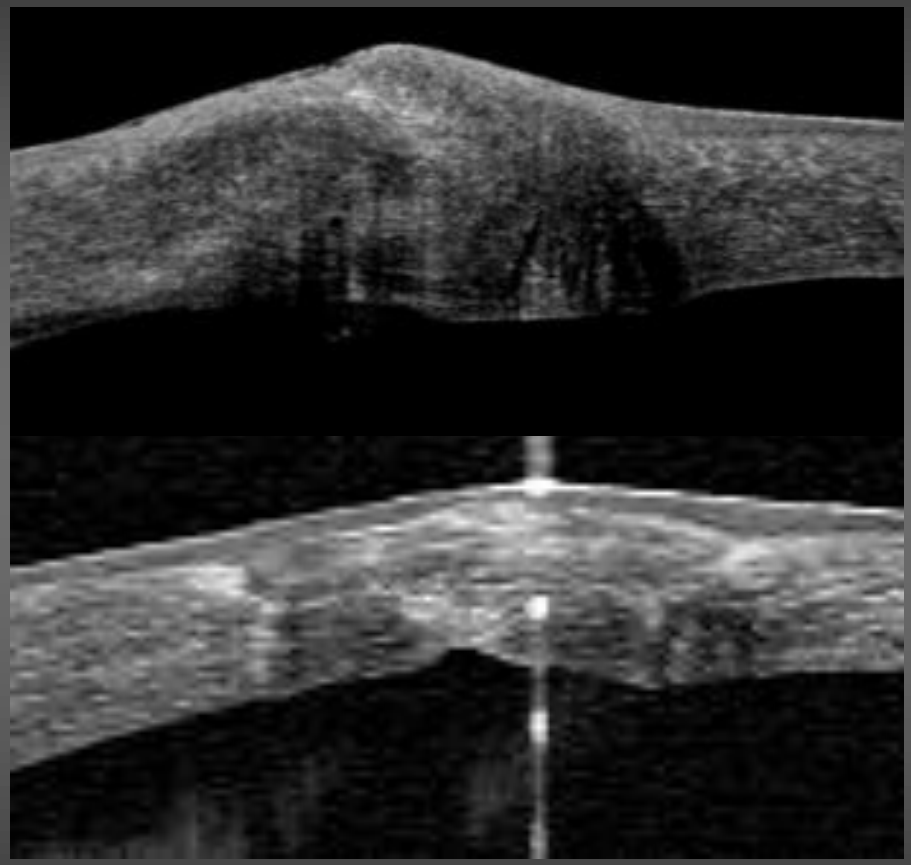
POM #6
517 microns

POM #9
478 microns

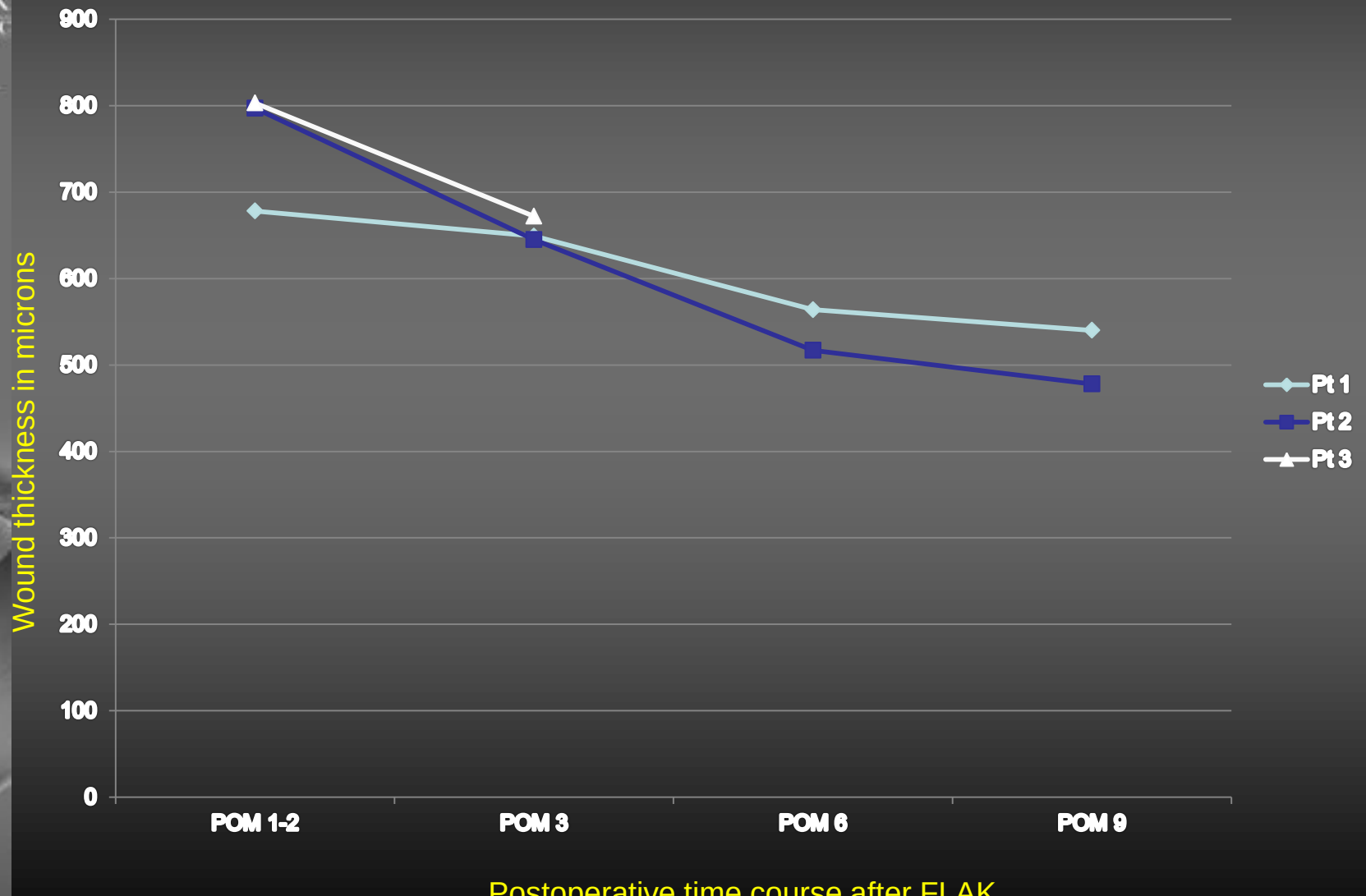
51yo M s/p FLAK for KCN

POM #1
803 microns

POM #3
672 microns



FLAK zig zag postoperative wound thickness



Conclusions

- The femtosecond laser can create custom-shaped incisions that can be verified by optical coherence tomography
- The zigzag shaped femtosecond laser incision pattern provides theoretic advantages with respect to wound architecture, including scar contracture as seen by AS-OCT
- Further comparison of wound healing with standard manual trephination should be performed.