Ablative Fractional Laser Resurfacing (AFLR) for Treatment of Cicatricial Ectropion & Periocular Scarring

Bradford W. Lee, MD, MSc
Assistant Professor of Clinical Ophthalmology
Division of Oculofacial Plastic & Reconstructive Surgery
Bascom Palmer Eye Institute / University of Miami

Cicatricial Ectropion & Lagophthalmos

• Cicatricial ectropion and lagophthalmos can result in corneal exposure and ulceration

• Scars can become thickened with abnormal pigmentation and texture
Traditional Management

• Non-surgical:
  – Massage, ocular lubrication
  – Steroid & 5-Fluorouracil (5-FU) injections

• Surgical:
  – Full-thickness skin grafts
  – Z-plasty
  – Flaps

Full-Thickness Skin Grafting

• Donor site morbidity
• Graft shrinkage, necrosis, and re-cicatrization
• Mismatch in graft thickness, color, and texture
Ablative Fractional Laser Resurfacing (AFLR)

- Originally indicated for laser skin rejuvenation and reduction of wrinkles
- ABLATIVE Lasers: CO2 (10,600 nm), Erbium YAG (2960 nm), YSGG (2790 nm)
- FRACTIONAL: treats a fraction of surface area in a grid pattern creating microscopic ablation columns
- Rapid healing without scar tissue formation
- Stimulates removal of damaged collagen, wound healing cascade, formation of new collagen and improved tissue organization

POM 5 s/p Full + Fractional Laser Resurfacing x 1 for wrinkles
Ablative Fractional Laser Resurfacing (AFLR) for SCARS

- Treatment of hypertrophic scars, keloids & burn contractures
- In non-ocular tissues, shown to improve:
  - Scar pliability
  - Texture & appearance
  - Range of motion
  - Scar biology/cytokine profiles

Shumaker et al, 2012
AFLR improves range of motion for joint contractures

Photos from Uebelhoer NS et al, 2012.

Laser Assisted Drug Delivery (LADD)

• Laser microchannels can assist in drug delivery
  – Stratum corneum limits topical drug penetration
  – AFLR disrupts the epidermis, allowing topically applied medications to reach deep into the scar/dermis
  – Even distribution throughout target tissue

Waibel et al, 2013
Our Hypothesis

If periocular scars are like eyelid contractures, . . .

. . . perhaps AFLR and LADD can effectively treat cicatricial ectropion and periocular scarring.

Case #1

- 27-year old male presented 6 weeks after a motorcycle accident with 2nd to 3rd degree facial burns.

- Three weeks prior, he developed progressive lagophthalmos with associated burning, tearing, and foreign body sensation.
Slit Lamp Exam

- VAsc: 20/50 OD, 20/20 OS
- Conjunctiva: mild injection OD, quiet OS
- Cornea: 2+ punctate epithelial erosions OD, clear OS
- Rest of exam was normal
Following 3 injections of 5-FU/Triamcinolone

Following 3 injections of 5-FU/Triamcinolone
Following 4 sessions of AFLR with LADD (topical 5-FU)
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Ablative Fractional Laser Resurfacing With Laser-Assisted Delivery of 5-Fluorouracil for the Treatment of Cicatricial Ectropion and Periocular Scarring

Bradford W. Lee, M.D., M.Sc., Alexandra E. Levitt, M.D., M.P.H., Benjamin P. Erickson, M.D., Audrey C. Ko, M.D., Neda Nikpoor, M.D., Nisreen Ezuddin, M.D., and Wendy W. Lee, M.D., M.S.
Case Series

• Retrospective case series

• Inclusion criteria:
  – Cicatricial ectropion not requiring urgent surgery for corneal exposure
  – Completed 3 treatments of AFLR with LADD (with 5-FU) spaced 6-12 weeks apart

• Treatment parameters
  – YSGG laser (2790 nm)
  – Treatment density 5-15%, depth: 1-2 mm

Clinical Outcomes

– Improvement in lagophthalmos and ocular surface staining (fluorescein)
– Dry Eye Symptoms (Ocular Surface Disease Index, OSDI)
– Scar Appearance (Patient and Observer Scar Assessment Scale, POSAS)
  • Pliability
  • Pigmentation
  • Vascularity
  • Thickness, Relief, and Surface Area
Results

- Of 4 cases with lagophthalmos, all improved and two showed complete resolution.

- All showed improved scar thickness, pigmentation, and texture
Mean improvement of 6 points on 15-point scale

Fluorescein Staining

Tear Breakup Time

Ocular Surface Disease Index

Mean improvement of 19.3 on a 40-point scale, p = 0.014

Mean improvement of 37.5 on a 120-point scale, p = 0.004
2 Rounds of AFLR with LADD
Conclusions

• First study to use AFLR with laser assisted delivery of 5-FU in the periocular region

• Functional improvement in cicatricial ectropion, lagophthalmos, and exposure keratopathy

• Aesthetic improvement not achievable by surgery alone (e.g. scar thickness, pigmentation, pliability, texture)

• AFLR can be an effective non-surgical treatment option or part of a multi-modality reconstructive plan.
Shukran!

Dr. Bradford W. Lee, MD, MSc
Email: blee@miami.edu
Bascom Palmer – Palm Beach Gardens & Miami