

AMERICAN ACADEMY  
OF OPHTHALMOLOGY®



# Oculofacial Plastic Surgery 2022

Jazz Up Your Oculofacial  
Plastic Surgery!

**Subspecialty Day | AAO 2022**

Chicago | Oct 1



# Oculofacial Plastic Surgery 2022

## Jazz Up Your Oculofacial Plastic Surgery!

### Program Directors

Thomas E Johnson MD and Cat Burkat MD FACS

**In conjunction with the  
American Society of Ophthalmic  
Plastic and Reconstructive Surgery**



McCormick Place  
Chicago, Illinois  
Saturday, Oct. 1, 2022

Presented by:  
The American Academy of Ophthalmology

Supported by an unrestricted grant from  
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### Oculofacial Plastic Surgery 2022

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Thomas E Johnson MD

*Program Director*

Cat Burkat MD FACS

*Program Director*

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Thomas E Johnson MD

2020 Jeremiah P Tao MD

Catherine J Hwang MD

2019 Richard C Allen MD PhD

Jeremiah P Tao MD

2018 Wendy W Lee MD

Richard C Allen MD PhD

2017 Vikram D Durairaj MD

Wendy W Lee MD

2016 Andrew R Harrison MD

Vikram D Durairaj MD

2014 David B Lyon MD FACS

Michael T Yen MD

2013 Robert G Fante MD

David B Lyon MD FACS

2012 Julian D Perry MD

Robert G Fante MD

2010 Don O Kikkawa MD

Robert G Fante MD

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Shahzad I Mian MD

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#### Staff

Ann L'Estrange, *Subspecialty Day Manager*

Melanie R Rafaty CMP DES, *Director,*

*Scientific Meetings*

Debra Rosencrance CMP CAE, *Vice*

*President, Meetings & Exhibits*

Patricia Heinicke Jr, *Copy Editor*

Mark Ong, *Designer*

Jim Frew, *Cover Design*

# Oculofacial Plastic Surgery Subspecialty Day 2022 Planning Group

On behalf of the American Academy of Ophthalmology and the American Society of Ophthalmic Plastic and Reconstructive Surgery (ASOPRS), it is our pleasure to welcome you to Chicago and Oculofacial Plastic Surgery 2022: Jazz Up Your Oculofacial Plastic Surgery!



**Thomas E Johnson MD**  
Program Director

None



**Cat Burkat MD FACS**  
Program Director

None

## Subspecialty Day 2022 Advisory Committee

**R Michael Siatkowski MD,  
Associate Secretary  
(Pediatric Ophthalmology)**  
None

**Maria M Aaron MD  
(Secretary for Annual  
Meeting)**  
None

**Bonnie An Henderson MD  
(Refractive Surgery)**  
Alcon Laboratories, Inc.: C  
Allergan, Inc.: C  
Horizon: C

**Michael S Lee MD (Neuro-  
Ophthalmology)**  
Horizon: C,US  
Panbela: C  
Pfizer, Inc.: US  
Springer: P  
Sun Biopharma: C  
UpToDate: P

## Jennifer Irene Lim MD (Retina)

Adverum Biotechnologies: S  
Aldeyra Therapeutics: S  
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Chengdu Kanghong: S  
Cognition Therapeutics: C  
CRC Press/Taylor and Francis: P  
Eyenuk: C  
Genentech: C,S,L  
Greybug: S  
Iveric Bio: C  
JAMA Ophthalmology Editorial  
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Luxa: C | NGM: S  
Novartis Pharma AG: C  
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Regeneron Pharmaceuticals, Inc.:  
C,S  
Santen, Inc.: C  
Stealth: S | Unity: C  
Viridian: C

## Shahzad I Mian MD (Cornea)

Kowa American Corporation: S  
Novartis: S  
Vison Care: S

## Jody R Piltz MD (Glaucoma)

Aerie Pharmaceuticals: C,L

## AAO Staff

**Ann L'Estrange**  
None

**Melanie Rafaty**  
None

**Debra Rosencrance**  
None

**Beth Wilson**  
None



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# CME Credit

## The Academy's CME Mission Statement

The purpose of the American Academy of Ophthalmology's Continuing Medical Education (CME) program is to present ophthalmologists with the highest quality lifelong learning opportunities that promote improvement and change in physician practices, performance, or competence, thus enabling such physicians to maintain or improve the competence and professional performance needed to provide the best possible eye care for their patients.

## Oculofacial Plastic Surgery Subspecialty Day Meeting 2022 Learning Objectives

Upon completion of this activity, participants should be able to:

- Identify algorithms that improve the diagnosis of oculofacial plastic surgery disease
- Improve the quality and safety of surgeries of the orbit, eyelid, and lacrimal system
- Describe pitfalls in the treatment of challenging conditions or patients
- Be familiar with practice patterns of experienced oculofacial practitioners

## Oculofacial Plastic Surgery Subspecialty Day Meeting 2022 Target Audience

The intended audience for this program includes oculofacial plastic surgeons and ophthalmologists performing basic or complex orbit, eyelid, and/or lacrimal surgery, as well as physicians in training.

## Teaching at a Live Activity

Teaching instruction courses or delivering a scientific paper or poster is not an *AMA PRA Category 1 Credit™* activity and should not be included when calculating your total *AMA PRA Category 1 Credits™*. Presenters may claim *AMA PRA Category 1 Credits™* through the American Medical Association. To obtain an application form, please contact the AMA at [www.ama-assn.org](http://www.ama-assn.org).

## Scientific Integrity and Disclosure of Conflicts of Interest

The American Academy of Ophthalmology is committed to ensuring that all CME information is based on the application of research findings and the implementation of evidence-based medicine. It seeks to promote balance, objectivity, and absence of commercial bias in its content. All persons in a position to

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## Subspecialty Day 2022 CME Credit

The American Academy of Ophthalmology is accredited by the Accreditation Council for Continuing Medical Education (ACCME) to provide CME for physicians.

### Friday Subspecialty Day Activity: Glaucoma, Pediatric Ophthalmology, Refractive Surgery, Retina (Day 1), and Uveitis

The Academy designates this Other (blended live and enduring material) activity for a maximum of 12 *AMA PRA Category 1 Credits™*. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

### Saturday Subspecialty Day Activity: Cornea, Oculofacial Plastic Surgery, and Retina (Day 2)

The Academy designates this Other (blended live and enduring material) activity for a maximum of 12 *AMA PRA Category 1 Credits™*. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

Physicians registered as In Person and Virtual are eligible to claim the above CME credit.

## Attendance Verification for CME Reporting

Before processing your requests for CME credit, the Academy must verify your attendance at AAO 2022 and/or Subspecialty Day. Badges are no longer mailed before the meeting. Picking up your badge onsite will verify your attendance.



## How to Claim CME

Attendees can [claim credits online](#). For AAO 2022, you can claim CME credit multiple times, up to the 50-credit maximum, through Aug. 1, 2023. You can claim some in 2022 and some in 2023, or all in the same year. For 2022 Subspecialty Day, you can claim CME credit multiple times, up to the 12-credit maximum per day, through Aug. 1, 2023. You can claim some in 2022 and some in 2023, or all in the same year.

You do not need to track which sessions you attend, just the total number of hours you spend in sessions for each claim.

### Academy Members

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### Nonmembers

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You will be able to obtain a CME credit reporting/ proof-of attendance letter for reimbursement or hospital privileges, or for nonmembers who need it to report CME credit:

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### Nonmembers

When you claim CME credits and complete the evaluation, a new browser window will open with a PDF of your certificate. Please disable your pop-up blocker. Your certificate will also be emailed to you.

## CME Questions

Send your questions about CME credit reporting to [cme@aaopt.org](mailto:cme@aaopt.org). For Continuing Certification questions, contact the American Board of Ophthalmology at [MOC@abpo.org](mailto:MOC@abpo.org).

# Faculty



**Cat Burkat MD FACS**  
Madison, WI



**Bitá Esmaeli MD FACS**  
Houston, TX



**Michael J Hawes MD FACS**  
Cherry Hills Village, CO



**Keith D Carter MD FACS**  
Iowa City, IA



**Robert A Goldberg MD**  
Los Angeles, CA



**John Bryan Holds MD**  
Des Peres, MO



**Jorge Corona MD**  
Dallas, TX



**Andrew R Harrison MD**  
Minneapolis, MN



**Thomas Edward Johnson MD**  
Miami, FL



**Lilangi S Ediriwickrema MD**  
Irvine, CA



**Morris E Hartstein MD**  
Ra'anana, Israel



**William R Katowitz MD**  
Wynnewood, PA



**Michael Kazim MD**  
New York, NY



**Bradford William Lee MD MSC**  
Honolulu, HI



**Ron W Pelton MD PhD**  
Colorado Springs, CO



**Robert C Kersten MD**  
Corte Madera, CA



**Wendy W Lee MD**  
Miami, FL



**Philip R Rizzuto MD FACS**  
Providence, RI



**Bobby S Korn MD PhD FACS**  
La Jolla, CA



**Nicholas R Mahoney MD**  
Baltimore, MD



**Daniel B Rootman MD MSc**  
Los Angeles, CA



**Andrea N Kossler MD**  
Palo Alto, CA



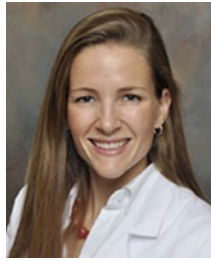
**Kenneth E Morgenstern MD**  
Wayne, PA



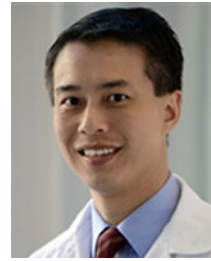
**Erin M Shriver MD**  
Iowa City, IA



**Rona Z Silkiss MD FACS**  
Oakland, CA



**Sara T Wester MD**  
Key Biscayne, FL



**Michael T Yen MD**  
Houston, TX



**David T Tse MD FACS**  
Weston, FL

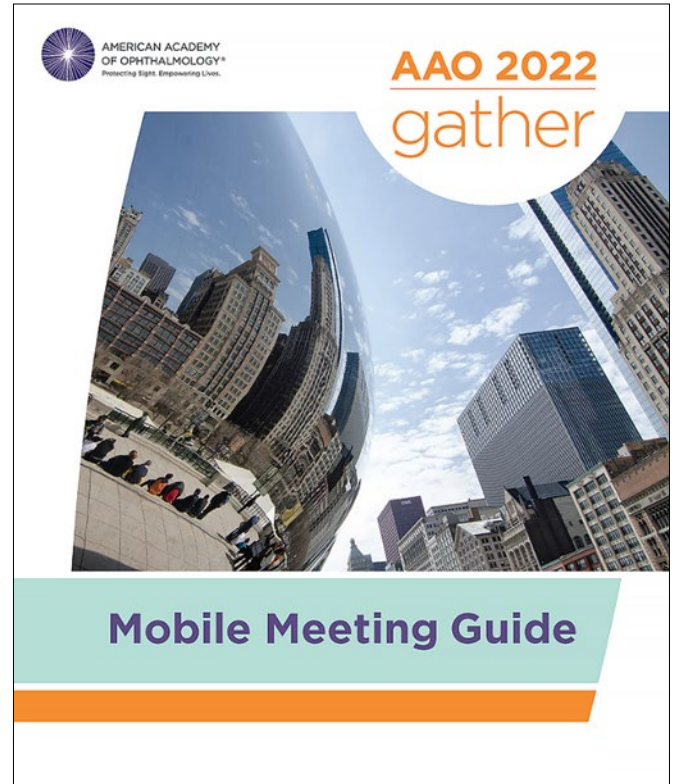


**Julie A Woodward MD**  
Durham, NC

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To ask the moderator a question during the meeting, follow the directions below.

- Access at [www.aao.org/mobile](http://www.aao.org/mobile)
- Select “Polls/Q&A”
- Select “Current Session”
- Select “Interact with this session (live)” to open a new window
- Choose “Ask a Question”



# Oculofacial Plastic Surgery Subspecialty Day 2022: Jazz Up Your Oculofacial Plastic Surgery!

## SATURDAY, OCT. 1, 2022

8:00 AM	Welcome and Introductions	Thomas Edward Johnson MD Cat Burkat MD FACS
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### Section I: Fine Tuning Aesthetics

Moderators: Cat Burkat MD FACS and Thomas Edward Johnson MD

Virtual Moderator, Morning Sessions: Andrew R Harrison MD

8:03 AM	Lower Lid Rejuvenation With Fillers: Increasing Volume While Reducing Instruments	Wendy W Lee MD	1
8:15 AM	Dissonance: Managing the Unhappy Blepharoplasty Patient	Robert A Goldberg MD	2
8:27 AM	Take the "Implant" Train	Kenneth E Morgenstern MD FACS	3
8:39 AM	Lasers That Jive and Energy-Based Devices That Scat-er	Julie A Woodward MD	4
8:51 AM	Q&A		

### Section II: New Instruments for Managing Malignancies

Moderators: Cat Burkat MD FACS and Thomas Edward Johnson MD

9:06 AM	What's New in the Treatment of Periocular Cancers: Hitting the High Notes	Bitia Esmali MD FACS	17
9:20 AM	"Hit the Road, Jack!" The Race to Cure Adenoid Cystic Carcinoma of the Lacrimal Gland	David T Tse MD FACS	18
9:34 AM	Q&A		
9:49 AM	In These Unprecedented Times . . .	Philip R Rizzuto MD FACS	19
9:54 AM	REFRESHMENT BREAK and AAO 2022 EXHIBITS		

### Section III: Bass-ics and Improvisation in Ptosis Surgery

Moderators: Cat Burkat MD FACS and Thomas Edward Johnson MD

10:25 AM	External Levator Advancement: The Leader of the Band	John Bryan Holds MD	21
10:37 AM	Conjunctival Müller Muscle Resection Rhythms and Blues	Daniel B Rootman MD MSc	24
10:49 AM	Conjunctival Müller Muscle Resection Improvisations	Morris E Hartstein MD	25
11:01 AM	The Newest Member of the Band: Frontalis Muscle Advancement	Bobby S Korn MD PhD FACS	26
11:13 AM	All About the Bass: Scoring With Tarsectomy	Cat Burkat MD FACS	27
11:25 AM	Q&A		
11:40 AM	LUNCH and AAO 2022 EXHIBITS		

**Section IV: Pediatric/Lacrimal Essentials**

Moderators: Keith D Carter MD FACS and Andrea N Kossler MD

Virtual Moderator, Afternoon Sessions: Nicholas R Mahoney MD

1:00 PM	External Dacryocystorhinostomy: You're Singing My Tune	Michael J Hawes MD FACS	28
1:12 PM	Endoscopic Dacryocystorhinostomy: Swinging It From the Inside	Bradford William Lee MD MSC	29
1:24 PM	Take Five: Pediatric Tumor Notes to Remember	William R Katowitz MD	30
1:36 PM	Q&A		

**Section V: Trumpeting in a New Era in the Management of Thyroid Eye Disease**

Moderators: Keith D Carter MD FACS and Andrea N Kossler MD

1:51 PM	Biologics for Thyroid Eye Disease: What's New and Next on Stage	Rona Z Silkiss MD FACS	31
2:03 PM	Smooth Operator! Surgery for Thyroid Eye Disease	Michael Kazim MD	33
2:15 PM	Take It Up an Octave! Elevating Your Treatment of Thyroid Eye Disease	Sara T Wester MD	34
2:27 PM	Dynamics and Challenges of Managing Eyelid Retraction	Erin M Shriver MD	35
2:39 PM	Q&A		
2:54 PM	REFRESHMENT BREAK and AAO 2022 EXHIBITS		

**Section VI: Orbital Melodies**

Moderators: Keith D Carter MD FACS and Andrea N Kossler MD

3:24 PM	Upbeats on the Use of Sclerosing Agents in Lymphatic Malformations	Lilangi S Ediriwickrema MD	36
3:36 PM	Orbital Cellulitis: Have We Modulated to a New Key?	Michael T Yen MD	38
3:48 PM	Management of Complex Orbital Tumors	Jorge Corona MD	39
4:00 PM	When It's Hot, It's Hot! Idiopathic Orbital Inflammation	Robert C Kersten MD	40
4:12 PM	Q&A		

**Section VII: OMIC Risk Management**

Moderators: Keith D Carter MD FACS and Andrea N Kossler MD

4:27 PM	OMIC: How to Stay On Key and Keep From Going Flat!	Ron W Pelton MD PhD	41
4:57 PM	Q&A		
5:27 PM	Closing Remarks	Thomas Edward Johnson MD Cat Burkat MD FACS	
5:28 PM	ADJOURN		





# Lower Lid Rejuvenation With Fillers: Increasing Volume While Reducing Instruments

**Wendy W Lee MD**

- I. Important Anatomy for Consideration of Fillers in the Lower Eyelid
- II. Best Choice of Fillers for the Lower Eyelid
  - A. Hyaluronic acids
- III. Injection Techniques
  - A. Needle
  - B. Cannula
- IV. Potential Complications
  - A. Avoidance
  - B. Treatment

# Dissonance: Managing the Unhappy Blepharoplasty Patient

**Robert Alan Goldberg MD**

## I. The Patient Experience: Beyond Objective Outcomes

- A. In surgical subspecialties we are trained to achieve objective outcomes (20/20).
- B. Aesthetic surgery is more about experience and emotion. In many cases the objective outcome is less important.
- C. Understanding this psychology is a key to a successful aesthetic practice.

## II. The Unhappy Post-Blepharoplasty Patient

Disappointed, Angry, Depressed, Symptomatic, Financially Tapped Out

## III. What Makes Patients Unhappy

- A. Asymmetry
- B. Subtle changes in lateral triangle shape
- C. “Round eye, not almond”: Circular orbital shape from unveiling, with long eyelid
- D. Scleral show (But slight enlargement can be attractive.)
- E. Fat bumps or bulges
- F. Visible scar
- G. Eyebrow fat deflation and secondary dermatochalasis

## IV. Management

- A. Facial appearance is an intimate subject.
- B. Change in facial appearance, especially around the eyes, can be an overwhelming experience.
- C. To effectively take care of these patients, you have to be prepared to address the fragile psychology and manage expectations.
- D. Value of a minimally invasive approach
  - 1. Minimize additional iatrogenic injury to orbicularis, nerve supply, independent lamellae.
  - 2. Minimize additional psychological trauma of surgery to “shell shocked” patient.
  - 3. Minimize expense to patient.
- E. Hyaluronic acid gel fillers
- F. En glove lysis avoids epithelial incision and maintains smooth posterior lamella against cornea.

# Take the “Implant” Train

***Kenneth E Morgenstern MD***

## I. Introduction

The aging process involves the loss of elasticity of the skin, loss of fat, and absorption of bone. We address these issues with a combination of skin care, lasers, injectables, and surgery. The goal of facial rejuvenation is to restore youthfulness while maintaining normal function. The lower lid and tear trough is one of those areas that suffer from all 3 of the aging processes.

## II. Anatomy of Tear Trough Aging

## III. Options for Volumizing the Tear Trough

A. Hyaluronic acid fillers

B. Autologous fat transposition or injection

C. Implants

## IV. Patient Selection for Type of Technique

## V. Surgical Technique and Tips for Placement of Tear Trough Options

## VI. Advantages and Disadvantages of Each Technique or Various Implants

## VII. Potential Risks and How to Manage Complications

## VIII. Short- and Long-term Results

# Lasers That Jive and Energy-Based Devices That Scat-er

## Lasers and Energy-Based Treatments for Cosmetic Improvement or Skin Rejuvenation

*Julie Woodward MD and Nicole Langelier MD*

### Summary

Currently there is a large assortment of energy-based devices marketed for cosmetic improvement of aging and sun-damaged skin and for improvement in naturally and iatrogenically acquired skin lesions and deformities. This presentation reviews the modalities available and is organized into six sections:

- Section 1: Ablative Laser Skin Resurfacing
- Section 2: Nonablative Laser Skin Resurfacing
- Section 3: Skin Tightening
- Section 4: Laser Treatment of Vascular Skin Lesions
- Section 5: Light-Based Treatment of Pigmented Skin Lesions
- Section 6: Tattoo Removal

### Section 1: Ablative Laser Skin Resurfacing

#### I. Indications and Contraindications

##### A. Indications

1. Rhytides
2. Contracted scars from acne, burns, iatrogenic; best treated with fractional ablative lasers
3. Photodamaged skin
4. Laser-assisted drug delivery – fractional lasers
5. Useful adjunct to blepharoplasty, particularly in the lower eyelid

##### B. Contraindications

1. Previous treatments damaging to dermal appendages may reduce healing and increase risk of scarring.
  - a. Patients who used isotretinoin (Accutane) within the past 12 months; controversial
  - b. History of deep dermal peels (phenol); proceed with caution.
2. Collagen vascular disease (scleroderma, systemic lupus erythematosus)
3. Uncorrected lower eyelid laxity; could develop ectropion
4. Previous lower lid transcutaneous blepharoplasty; could develop ectropion
5. Active infection or herpes lesions

#### II. The Preprocedure Evaluation

- A. Fitzpatrick skin typing
- B. Glogau scale for photodamage
- C. Assess whether rhytides are resultant from chronological aging or photoaging
- D. Topical retinoid use; may have thinner epidermal thickness. Consider areas of zonal variation from patient to patient.
- E. History of hypertrophic scars, keloid formation, cold sores
- F. History of previous peels: chemical/s used, reaction to peel, frequency, how recent
- G. For full-face treatment, antiviral prophylaxis (Valtrex 1000 mg PO q.d.) should be started 1 day before the procedure and continue until postoperative day 10. Double the dose if breakthrough herpes simplex virus (HSV) dermatitis occurs.
- H. How much “downtime” can the patient tolerate? Warn patient that even a light fractional treatment can require 7 days to re-epithelialize, with weeks of redness after treatment.

#### III. Alternatives to this Procedure

- A. Conventional dermabrasion
- B. Chemical peels
  1. Alpha hydroxy acids (glycolic, lactic) are keratolytic and increase epidermal cell turnover.
  2. Beta hydroxy acids (salicylic, lipohydroxy) are noninflammatory, keratolytic, and anticomedogenic and penetrate deeper into pores.
  3. Jessner’s solution: 14% lactic acid, 14% resorcinol, 14% salicylic acid
  4. Trichloroacetic acid (TCA) denatures keratin to exfoliate and increase cell turnover.
- C. Tissue augmentation by autologous fat or fillers (bovine collagen, silicon, or hyaluronic acid)
- D. Botulinum toxin
- E. Skin care regimen
- F. Nonablative lasers
- G. Microneedling devices, either with or without radiofrequency

## IV. The Instrumentation, Anesthesia, and Technique

A. Instrumentation: traditional vs. fractional; both available in CO<sub>2</sub> and erbium:YAG (Er:YAG)

1. Traditional ablative laser will remove 100% of the epithelium.
  - a. Fluence = 7-10 J/cm<sup>2</sup>
  - b. Requires more time to re-epithelialize, ~10 days
  - c. Erythema is typical for 4-6 months.
  - d. The reservoir for a new epithelium needs to arise from appendages (pores and hair follicles).
  - e. Preferred for patients with diffuse superficial pigment
  - f. Unpredictable scarring or pigmentation is more likely than with fractional ablative.
2. Fractional ablative laser will remove only about 9%-60% of the total surface area of the skin.
  - a. Microablated columns (MACs) are created that extend 200 to 2000  $\mu$ m.
  - b. Fluence = up to 700-1000 J/cm<sup>2</sup>
  - c. Islands of untouched epithelium will help to re-epithelialize the skin.
  - d. Typical re-epithelialization time is ~7 days.
3. CO<sub>2</sub> and erbium lasers are produced by over a dozen companies. *The chromophore for both is water.*
  - a. CO<sub>2</sub>, 10,600 nm: Less bleeding because it is absorbed by water as well as other proteins and fat that increases heat and thus coagulation; can also be used for incisional blepharoplasty and other surgery
  - b. Er:YAG, 2940 nm: Nearly 20 times more specific for water and less absorption by adjacent proteins = increased bleeding

## B. Anesthesia

1. Topical anesthesia: EMLA and Pliaglis are FDA approved. Others can be formulated depending on state laws. Beware of dosing and anesthetic toxicity.
2. Regional nerve blocks to supraorbital, supra-trochlear, infraorbital, and mental nerves are very effective. More pain in area of temples and lateral face is common. Combining with tumescent can be beneficial.
3. General: May be helpful for full-face treatments using ablative CO<sub>2</sub> laser.

## C. Technique

1. Eye protection for all staff with appropriate glasses/goggles

2. Eye protection for the patient (contact lens, Davod-Baker plate, Jagger plate)
3. Turn off supplemental oxygen, sign on door, smoke evacuator
4. The angle of the jaw and areas of heavy rhytides should be marked in the upright position prior to anesthetizing the area.
5. Sterile skin prep
6. Test the laser on a wet tongue depressor to ensure coaxial beam and correct settings.
7. Single pulse or repeat pulse may be utilized.
8. Power setting is dependent on the area treated; in the periorbital area, lower power is recommended.
9. Shallow rhytides usually require a single pass; moderate to deep rhytides may require a double or triple pass.
10. Dynamic rhytids such as crow's feet due to muscles will not improve. These require neuro-modulators.
11. After each pass, exfoliation is to be performed for traditional laser resurfacing, prior to the next pass of laser.
12. The angle of the jaw and neck are prone to scarring because there are fewer appendages (hair follicles and pores) to serve as reservoir for new epithelial cells.
13. The laser should be delivered in a "feathered" fashion in order to avoid demarcation lines where each pass is smaller than the previous pass.
14. The perioral area and festoons can be resurfaced with 2-3 passes.
15. Never place more than 1 pass on the inferior tarsal plate, to avoid ectropion.
16. Apply Aquaphor ointment immediately postoperatively (avoid in lanolin-allergic patients).

## V. Complications and Their Prevention and Management

## A. Intraoperative

1. Bleeding: More common with erbium laser because there is less coagulation of blood vessels
2. Thermal burns
3. Laser-associated risks: eye injury, fire

## B. Postoperative (see Figure 2)

1. Infection
2. Prolonged erythema
3. Scar formation: Often on angle of jaw and neck
4. Lid retraction: If lower lid resurfacing was performed

5. Hyperpigmentation: Common; usually resolves easily
6. Hypopigmentation: Uncommon but often permanent
7. Milia/acne

C. Prevention of complications

1. Stop aspirin and blood thinners before surgery for erbium.
2. Select the adequate patient and individualize treatment
3. In darker skin, pretreat for 7-14 days with Retin-A or pigment gel with kojic acid to reduce the risk of hyperpigmentation.
4. Oral valacyclovir (Valtrex) 1000 mg PO q.d. for 10 days. Start earlier with longer duration in patients with history of HSV lesions.
5. Turn off the oxygen while resurfacing.
6. Do not extend resurfacing down to the reticular dermis.
7. Beware that turning energy down may result in an undesirable burn rather than desired ablation.

D. Management of complications

1. Hydroquinone cream, pigment gel, and/or non-hydroquinone topical treatments in cases of hyperpigmentation
2. Be aware of possible skin infections, and select appropriate treatment.

VI. Patient Postoperative Instructions

- A. Vinegar soaks with 1 cup water to 1 teaspoon distilled white vinegar q2 hours used to remove emollients will minimize chance of infection by decreasing chance of colonization. Acidity inhibits bacterial growth. Each cleaning should only take 2 minutes; then replace topical emollients. Avoid Aquaphor in patients with lanolin allergy. Topical antioxidants and growth factor products have safely been started immediately after surgery.
- B. Day 7 to 10: Cut soaks to q.i.d. and begin mineral-based sunblock.
- C. Makeup OK on Day 10
- D. If full-face resurfacing performed, consider use of antiviral medication until postoperative day 10.

VII. Physician Care

- A. Postop appointments on the following days:
  1. Day 1 or 2 to check for proper amount of topical emollients
  2. Day 4-5 to check for contact dermatitis
  3. Day 6-7 to check for proper epithelialization and switch to sunblock

4. Day 10 to check for complete epithelialization and approve use of makeup

- B. Supportive counseling: The amount of crusting, redness, swelling, and itching can be alarming for the patient. Provide reassurance for normal stages of healing and treatment for excessive itching or signs of infection.

- C. Long-term instructions: Generally avoid sun exposure up to 6 months: glasses, zinc-based sunscreen, hat

VIII. Controversies

- A. Oral antibiotics: Some studies show these disturb normal flora and actually increase infection.
- B. Topical antibiotics: Can cause scarring from contact dermatitis when skin is vulnerable and healing.
- C. Laser-assisted drug delivery with fractional lasers: Drugs include L- ascorbic acid (vitamin C), botulinum toxins, hyaluronic acids, poly-L-lactic acid, melanocytes for vitiligo
- D. Accutane: Generally recommended to stop for 6 months to 1 year prior, but many dermatologists will perform various lasers earlier.

IX. Photos



Figure 1

## X. Selected Readings

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3. Fitzpatrick RE, Goldman MP, Ruiz-Esparza J. Clinical advantage of the CO2 laser superpulsed mode. *J Dermatol Surg Oncol*. 1994; 114; 20:449-456.
4. Goldbaum AM, Woog JJ. The CO2 laser in oculoplastic surgery. *Surv Ophthalmol*. 1997; 42:255-267.
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7. Sullivan SA, Dailey RA. Complications of laser resurfacing and their management. *Ophthalmic Plast Reconstr Surg*. 2000;16:417-426.
8. Walia S, Alster TS. Cutaneous CO2 laser resurfacing infection rate with and without prophylactic antibiotics. *Dermatol Surg*. 1999; 25(11):857-861.
9. Woodward JA, Fabi SG, Alster T, Colón-Acevedo B. Safety and efficacy of combining microfocused ultrasound with fractional CO2 laser resurfacing for lifting and tightening of the face and neck. *Derm Surg*. 2014; 40(suppl 12):S90-93.
10. Woodward JA. Techniques, pearls and management of complications of fractional laser resurfacing and blepharoplasty. Lutronic. <http://www.usa.lutronic.com/webinars>. May 29, 2013.

## Section 2: Nonablative Skin Resurfacing

## I. Goal

The goal of this procedure is to resurface the skin with minimal downtime. Disadvantages are the multiple treatments required and that the results still remain minimal compared to ablative lasers.

## A. Nonfractional

1. 1319-nm Sciton Thermascan
2. 1320-nm Nd:YAG, Cool Touch or Alma Harmony
3. 1450-nm Candela Smoothbeam

## B. Fractional: With thousands of microthermal zones (MTZs) that are columns of coagulated (not ablated) tissue to provide mild improvement of fine rhytides, pigment, scars, and erythema/telangiectasia

1. 1410 nm, Solta/Valeant, Fraxel Re:Fine

2. 1440 nm, infrared diode/1927 nm thulium (Clear and Brilliant Solta/Valeant)
3. 1565 nm, ResurFX Lumenis
4. 1540 nm, Palomar StarLux and Icon
5. 1550 erbium glass/or with 1927 nm, Fraxel, Solta/Valeant re:store and re:store DUAL

## II. Technical Details

The fractional devices can place up to 1 million MTZs of 500 to 1500 microns during a full-face treatment. Turnover and tissue remodeling of the epidermis and dermis are stimulated. Healing is rapid because zones of unheated tissue between the MTZs initiate rapid repair. Advantage is minimal downtime in comparison to ablative devices. Disadvantage is less efficacious and often requires multiple treatments.

## III. Indications and Contraindications

A. Indications: fine rhytides, superficial pigment, scars, erythema matting, telangiectasia, melasma in combination with other treatments

## B. Contraindications

1. Relative: darker Fitzpatrick skin types 3-6, larger telangiectasia, deep dermal pigmented lesions, history of HSV, use of Accutane in past 6 months to 1 year, unrealistic expectations
2. Absolute: active infection, scleroderma

## IV. The Pre-procedure Evaluation

## A. Patient history

1. Goal: Rhytide improvement vs. acne scars vs. pigmentation
2. Ask about prior HSV, Accutane.

B. Clinical examination: Fitzpatrick skin type, lentigos and superficial pigment vs. melasma

C. Preoperative assessment: standardized photographs

## V. Alternatives

A. Rhytides: ablative lasers, chemical peels

B. Scars: facial fillers

## C. Pigmentation

1. Superficial pigment: pigment lasers, intense pulsed light (IPL) or green lasers
2. Melasma: possibly q-switched or picosecond.
3. Topical creams such as retinoids, antioxidants, and skin lighteners (tyrosinase inhibitors) or bleaches (lignin peroxidase)

## VI. Technique

Often can be performed by physician extenders under topical anesthetic such as Plagiis or EMLA or regional nerve blocks

**VII. Controversies**

- A. Efficacy
- B. Patient counseling needed for multiple treatments with subtle results
- C. Enhancement of topical drug delivery such as steroids or antioxidants with fractional devices

**VIII. Pertinent Patient Management in Terms of Treatment and Follow-up**

- A. Postoperative instructions: Ice for erythema. Usually recovery is rapid, in just 1-2 days.
- B. Medications: Often OTC meds postoperatively; consider topical emollient for first day.
- C. Describe other management considerations. An excellent choice for patients who cannot tolerate more than a few days of downtime.
- D. Describe the common patterns of response to treatment and discuss strategies of follow-up and secondary treatment.
- E. Complications
  - 1. Postinflammatory hyperpigmentation (PIH), urticaria, urticaria recall
  - 2. Accutane: Many argue that lasers can be done on patients who have been on Accutane (maybe more important in ablative laser, where depth of injury is beyond the epidermis). Mention level of tissue injury/depth as well as nonablative vs ablative.

**IX. Selected Readings**

- 1. [www.ncbi.nlm.nih.gov/](http://www.ncbi.nlm.nih.gov/)
- 2. Ramsdell WM. Fractional carbon dioxide laser resurfacing. *Semin Plast Surg.* 2012; 26:125-130.
- 3. Ramsdell WM. Complications of fractional carbon dioxide laser resurfacing. *Semin Plast Surg.* 2012; 26:137-140.

**Section 3: Skin Tightening/Lifting With Novel Energy-Based Devices****I. Goals**

- A. To create a subepidermal wound to tighten the deep layers of the dermis and beneath the dermis by creating heat, stimulating new collagen and elastin and thus tissue tightening
- B. Immediate partial collagen denaturation followed by long-term wound healing. Collagen bonds break at 60 degrees C.
- C. This may not completely rejuvenate the skin. May be best used in conjunction with a machine that treats the superficial dermis.
- D. Can be in a device combined with infrared (IR), or IPL

- E. Can be used in any Fitzpatrick skin type because risk of PIH is low
- F. Younger patients are better candidates.
- G. Results are subtle. Proper patient counseling to manage expectations is necessary. Not a replacement for patients who need surgery.

**II. Devices**

- A. Radiofrequency (RF): monopolar vs. bipolar; takes 2-3 treatments
  - 1. Monopolar: low intensity, high-volume heating
    - a. Thermage
      - i. has undergone 3 versions
      - ii. with disposable tips and active cooling T – Solta/Valeant. Brow lift 2-4 mm. FDA approved for periorbital reduction. Comfort pulse technology (CPT) minimizes pain and risk of damage to subcutaneous fat.
    - b. Pelleve/Ellman: monopolar with disposable wand
    - c. Exilis: face and body handpieces
    - d. Titan/Cutera: stamping wand
  - 2. Accent
  - 3. Viora
  - 4. Fractora Firm: moveable wand lightweight; has epidermal temperature control for about 43 degrees C
  - 5. Matrix RF
  - 6. Microneedles with bipolar RF: low-volume, high-intensity heating
    - a. Lutronic Infini, South Korea: disposable tips with multidepth range with 49 insulated 34-gauge needles; coagulation 60-85 degrees C
    - b. ThermiRF: the first microneedle RF target temp. 65-70 deg F
      - i. Thermitight
        - (a) fat in the neck
        - (b) tissue tightening up to 23%
      - ii. Thermi-dry: for axillary hyperhidrosis
    - c. E-prime: 10 needles, 4 seconds
    - d. Fractora
  - 7. Noninsulated microneedles: EndyMed PRO, Intensif applicator, EndyMed Medical, Cesarea, Israel; disposable tips, multidepth range 1-3.5 mm
  - 8. Multiphase RF fractional: Eclipse
  - 9. CO2 laser with RF: Eclipse



10. Bipolar RF from Lumenis Aluma and Syneron/Candela
11. Morpueus
- B. Microfocused ultrasound: Ulthera/Merz Aesthetics
  1. Disposable transducers 4.5 mm 7.5 MHz, 3.0 mm 7.5 MHz, and 1.5 mm 10 MHz depth
  2. Creates temperatures of up to 60 degrees C that create zones of thermal injury measuring 1-1.5 mm<sup>3</sup>
  3. No eye shield can protect the eyes from ultrasound energy.
  4. FDA approved for brow lift
  5. High-cost disposables
  6. Generally 60%-65% patient satisfaction

### III. Indications and Contraindications

- A. Indications: brow ptosis, lax jowls, submental ptosis, lax nonfacial skin, acne scars
- B. Contraindications, Relative
  1. Accutane use less than 6 months, history of HSV, history of gold therapy, connective tissue disease, extremely lax platysma, usually with advanced age will not be good candidates
  2. Monopolar devices in patients with cardiac arrhythmias or pacemakers
  3. Cystic acne
  4. Open wounds

### IV. The Preprocedure Evaluation

- A. Patient history: Previous treatments/facelift, facial asymmetries. Patients in their 40's and 50's are the best candidates.
- B. Clinical examination: All Fitzpatrick skin types can be treated for all devices that treat deeply. PIH is a consideration if treatment is superficial.
- C. Preoperative assessment: Moderate jowls and submental ptosis is ideal. Severe laxity in older patients will not see much improvement. Can be used after facelift to treat small areas of laxity.

### V. Technique

In-office procedure often performed by physician extenders with topical or regional anesthesia. Fillers should be done after these procedures.

### VI. Controversies

- A. Efficacy, unpredictable results. Physicians should carefully evaluate photographs from industry. More comparison studies are needed.
- B. Accutane: Many argue that lasers can be done on patients who have been on Accutane.

### VII. Pertinent Patient Management in Terms of Treatment and Follow-up

- A. Postoperative instructions: minimal downtime, or just 1 day after a microneedling procedure. Ecchymosis possible if anesthetic delivered via a needle.
- B. Rare postoperative pain medicines
- C. Other management considerations
- D. Describe the common patterns of response to treatment and discuss strategies of follow-up and secondary treatment.

### VIII. Complications

- A. Nerve paresis, particularly the marginal mandibular
- B. Dysesthesias
- C. Depressed scars
- D. Undesirable loss of subcutaneous fat
- E. Skin necrosis

### IX. Historical Perspective

Highlights of advances and individuals related to this entity

### X. Selected Readings

1. Gold MH. Noninvasive skin tightening treatment. *J Clin Aesthet Dermatol.* 2015; 8(6):14-18.
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3. Pritzker RN, Hamilton HK, Dover JS. Comparison of different technologies for noninvasive skin tightening. *J Cosmet Dermatol.* 2014; 13(4):315-323.
4. Mask A. Non-surgical facelift can take off three years. Wral.com. [www.wral.com/lifestyles/healthteam/story/10706883/](http://www.wral.com/lifestyles/healthteam/story/10706883/). February 9, 2012.

## Section 4: Laser Treatment of Vascular Skin Lesions

### I. Goals

To shut down small blood vessels in the skin without disturbing the surrounding skin architecture. Critical issue is that the peak absorption of the chromophore oxyhemoglobin is 577 nm.

### II. Wavelengths

The longer wavelengths are less well absorbed by hemoglobin but they penetrate deeper into the skin.

- A. 532 nm KTP: variable pulse widths (PW) 1-100 ms. Red facial telangiectasias, rosacea. Does not leave purpura.
- B. 585-595 nm pulsed dye: 0.5 to 40 ms. Port wine stains, rosacea, venous lakes. Purpura will last 5-10 days.

- C. 755 nm long pulsed Alexandrite: 3-100 ms. Leg telangiectasia, venous malformations.
- D. 800 nm diode: 5-400 ms. Leg venulectasias, blue reticular veins.
- E. 1064 nm long pulsed neodymium YAG: 0.25 to 500 ms. Deep reticular veins.
- F. Intense pulsed or broad band light (IPL or BBL): 400-1200 nm

### III. Common Lesions of the Face and Neck That Are Treatable: Indications

- A. Telangiectasias
  - 1. Commonly associated with Rosacea or photo-damage
  - 2. Multiple sessions often required
  - 3. Best treated KTP 15-20 ms, IPL and PDL (pulsed dye laser) 10-16 ms
  - 4. Vigorous cooling is needed for surrounding skin structures, especially with the PDL
- B. Cherry hemangiomas
  - 1. Best treated with the above devices
  - 2. Generally easily eradicated
- C. Port-wine stains
  - 1. Capillary malformation of mid to upper dermis
  - 2. 5%-10% have Sturge Weber
  - 3. Most often treated by specialized dermatologists with PDL
- D. Poikiloderma of Civatte
  - 1. Red flushing along angle of jaw, upper neck, and chest with epidermal atrophy and actinic dyspigmentation
  - 2. IPL, PDL, and KTP
- E. Venulectasias
  - 1. Commonly noted on leg and inferolateral orbital rim
  - 2. Often treated with long pulsed 1064 nm
  - 3. Cooling is needed to avoid burns to skin.
  - 4. On legs surrounding hypopigmentation can occur.
- F. Infantile capillary hemangiomas
  - 1. 50% regress by age 5.
  - 2. Laser treatment remains controversial.

### IV. Dry Eyes

- A. IPL and BBL have been touted to decrease problematic dry eyes associated with rosacea. This may be due to decreasing inflammatory cytokines extruding from dilated facial vessels.
- B. There is minimal peer-reviewed research in this area. The FDA has granted de novo authorization to Lumenis Ltd. for its newest IPL device for improving signs of dry eye disease due to meibomian gland dysfunction (MGD).
  - 1. FDA study sponsored by Lumenis: internal reference LUM-VBU- M22-IPL-17-01.
  - 2. Vegunta S, et al. Combination IPL/MGX. *Cornea* 2016.
    - a. 81 patients
    - b. No control
  - 3. Vora GK, Gupta PK. IPL for dry eye [review]. *Current Opin Ophthalmol.* 2015.
  - 4. Craig JP, et al. Prospective trial IPL for Rx MGD. *Invest Ophthalmol.* 2015.
    - a. 28 patients
    - b. 2-4 Rx
    - c. 86% improved symptoms
- C. Contraindications
  - 1. Darker Fitzpatrick skin types can experience loss of pigment, especially on the legs. Treatment too close to the eyes can cause ocular damage. Extreme caution must be used in the periocular area.
  - 2. Active infections
  - 3. Redness from same-day neuromodulator or filler injections
- D. Preprocedure evaluation
  - 1. Patient history: Documentation of the above conditions and Fitzpatrick skin type 1-6
  - 2. Clinical examination: Document red or blue color of lesions and their location
- E. Alternatives
  - 1. Electrocautery or radiofrequency to fine vessels
  - 2. For rosacea: topical Metrogel or Mirvaso
- F. Techniques
  - 1. There is a broad range of machines and companies that supply these devices.
  - 2. Staff and physician must be properly trained by the company.
  - 3. Protective lenses must be worn by the patient and all staff in the room.
  - 4. Cooling devices for the skin are required.

- G. Pain control: Usually the treatment feels like a “hot rubber band snap.” Topical anesthetics are an option but often not needed. Skin cooling with forced cold air, a chill tip associated with the laser or ice are effective. Regional nerve blocks without epi are an option for port wine stains.
- H. Ongoing controversies
1. Dry eye treatment with IPL and BBL
  2. Treatment of deep periocular reticular veins with long pulsed 1064 nm
- I. Pertinent patient management in terms of treatment and follow-up: Postoperative instructions
1. 532 nm: often just ice for day of treatment. If a blister develops, see below. Makeup can be worn same evening.
  2. Longer pulsed lasers: Patience for purpura to resolve
- J. Complications
1. Blisters: Usually occur along corners of the nose. Treat with vinegar soaks q.i.d. and Aquaphor or Vaseline. If severe, could cause scarring.
  2. Surrounding hypopigmentation may be permanent. Topical prostaglandins may help repigment.
  3. Disease-related complications: Rosacea and venous insufficiency tend to promote reoccurrence of vascular lesions over time. Patients must be made aware of need for future treatments.
- K. Historical perspective: Earlier lasers included 488-638 nm argon, 511 and 578 nm copper bromide, and 568 nm krypton, but these often caused scarring due to improper pulse durations.

#### V. References

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2. Bencini PL, Tournalaki A, De Giorgi V, Galimberti M. Laser use for cutaneous vascular alterations of cosmetic interest. *Dermatol Ther.* 2012; 25(4):340-351.
3. Zachary CB, Rofagha R. Laser therapy. Physical treatment modalities, section 20:2261-2281.

#### I. Photos



Figure 2

## Section 5: Light-Based Treatment of Pigmented Skin Lesions

### I. Goal: To Minimize Melanin-Containing Lesions

- A. Treatment can involve either removal of just the pigment or ablation of the entire lesion via ablative lasers.
- B. Melanin has a broad absorption spectrum: many lasers can be used to treat these lesions with appropriate laser selection considering the depth of the lesion.

### II. Technology

- A. Long pulsed devices with pigment chromophore: Used at their shorter pulse widths (PW) available
  1. IPL or BBL: 500-1200 nm, 5-10 ms,  $\leq 30 \text{ J/cm}^2$ : For lentigines and ephelides, nevi
  2. 532-nm KTP, 8-10 ms: For superficial lentigines and ephelides
  3. 595-nm pulsed dye, 0.45-1.5 ms, 3-5  $\text{J/cm}^2$ : Often used for treatment of vascular lesions. Use of compression blanches the vascular component and allows melanin to be targeted.
  4. 694-nm ruby, 1-4 ms, 5-30  $\text{J/cm}^2$ : Acquired junctional melanocytic nevi. Recurrence is common with congenital nevi due to remaining deeper nevus cells.
  5. 755-nm alexandrite, 0.5-300 ns: Acquired junctional melanocytic nevi. Recurrence is common with congenital nevi due to remaining deeper nevus cells.
  6. 800-nm diode, 5-100 ms, 5-50  $\text{J/cm}^2$
  7. 1064-nm neodymium:YAG, 1-100 ms,  $\leq 300 \text{ J/cm}^2$ : Nevi
- B. Q-switched lasers PW available in nanoseconds
  1. 532-nm frequency doubled Nd:YAG, 5-10 ns, 0.4-6  $\text{J/cm}^2$ : For superficial lentigines and ephelides
  2. 694-nm ruby, 20-40 ns, 3-12  $\text{J/cm}^2$ : Good for deep pigment, nevus of Ota
  3. 755-nm alexandrite, 50-100 ns, 1-12  $\text{J/cm}^2$ : Deep pigment, nevus of Ota
  4. 1064-nm Nd:YAG, 5-10 ns, 3-12  $\text{J/cm}^2$ : Deeper penetration, useful for dermal pigmented lesions, safer than shorter wavelength lasers in darker skin
- C. Ablative lasers: chromophore is water and not melanin.
  1. 10,600-nm carbon dioxide
    - a. Ablates lesion and surrounding epithelium with moderate coagulation
    - b. Could risk PIH post

2. 2940-nm Er:YAG
  - a. Ablates with minimal coagulation
  - b. Slightly less risk of PIH

### III. Indications and Contraindications

#### A. Indications

1. Ephelides and lentigines
  - a. Superficial papillary dermis, best treated with IPL, BBL, 532 nm, or QS 532 nm
  - b. Ablative CO<sub>2</sub> and erbium nicely remove, yet risk of recurrence
2. Benign melanocytic nevi
  - a. Controversial without pathology
  - b. Post-treatment fibroplasia overlying lesion can mask early signs of malignant change.
3. Café 'au-lait macules (CALM)
  - a. Hypermelanosis of basal melanocytes and keratinocytes, prone to resistance and recurrence
  - b. Rule out neurofibromatosis
  - c. 2-4 treatments approx. 8 weeks apart
4. Melasma
  - a. A common yet complex and challenging condition with pigment in epidermal melanocytes and/or dermal melanophages caused by genetics, hormones, and UV light
  - b. Commonly seen on the face in women after pregnancy or oral contraceptive use
  - c. Recurrence is likely. PIH after treatment can exacerbate the problem. Treatment must be done in conjunction with topical retinoids, steroids, skin lightening creams, and sun block.
  - d. Categorized by pigment depth and location. Epidermal vs. dermal pigment. Woods lamp detects epidermal pigment. Dermal pigment does not respond to topical treatments.
  - e. All of the aforementioned lasers have been used. Additionally, nonablative fractionated devices may be of benefit, possibly by increasing drug delivery of hydroquinone through microthermal zones. Please see nonablative section 2 above.
5. Nevus of Ota
  - a. Spindled melanocytes in papillary dermis (nevus of Ito and blue nevi have similar histology)
  - b. High fluences and multiple treatments (spaced  $\geq 6$  weeks apart) required
  - c. Q-switched lasers required; risk of hypopigmentation is lower with alexandrite.

6. Postinflammatory hyperpigmentation (PIH)
  - a. Can be due to melanin, extravasated hemosiderin, or drug metabolites
  - b. Q-switched lasers expedite resolution
  - c. Combine laser treatment with topical therapy including skin lighteners, retinoids, peels, and sunblock
7. Drug-induced hyperpigmentation
  - a. doxycycline, minocycline, amiodarone, azidothymidine
  - b. Discontinue drug, trial of topical treatment followed by laser therapy.
- B. Contraindications
  1. Relative: Fitzpatrick skin types 3-6 are more prone to PIH and recurrence or unwanted hypopigmentation.
  2. Absolute: Pigmented intradermal melanocytic nevi require biopsy
- IV. The Preprocedure Evaluation
  - A. Patient history: History of skin cancer, autoimmune disease, resistant melasma, location of lesions, association with pregnancy or oral contraceptives, sun exposure/protection habits.
  - B. Clinical examination
    1. Best-treated lesions are superficial ephelids and lentigines (lentigos).
    2. The physician needs to be confident in diagnosing pigmented intradermal melanocytic nevi that contain a chaotic pigment pattern at risk for melanoma, hyperpigmented actinic keratosis, pigmented seborrheic keratosis, or other lesions that have malignant potential.
    3. Patients must return for assessment if the laser-treated lesion changes in the future.
  - C. Preoperative assessment - Medical aestheticians should not treat lesions unsupervised by the physician directly. Ability of an aesthetician to use IPL and BBL is determined by individual states laws.
- V. Alternatives
  - A. Retinoids
    1. Increase penetration of skin-lightening agents as well as lightening the skin itself
    2. Decrease c-Jun gene, increase TGF beta, increase matrix metalloproteinase
    3. Takes at least 3 months to show improvement, with best effect within 9 months
      - a. OTC: Retinol, retinaldehyde
      - b. Rx: tretinoin, tazarotene, adapalene
  - B. Skin lighteners by mechanism:
    1. Blocks production of melanin
      - a. Hydroxyquinone 2%-4%
        - i. Tyrosinase inhibitor reduces conversion of DOPA to melanin. Free radical damage to melanosomes and melanocytes.
        - ii. Banned in EU and concentration limited in U.S. due to concern over carcinogenicity. Can cause onychomycosis and nail pigmentation.
        - iii. Use in 4-month cycles; don't combine with peroxide or resorcinol. Don't use around eyes. Must use sunscreen.
      - b. Decapeptide 12 (Lumixyl): tyrosinase inhibitor
      - c. Ellagic acid: polyphenol, copper chelation reduces action of tyrosinase and decreases melanocyte proliferation.
      - d. Kojic acid 1%-4%: tyrosinase inhibitor from fungus and antioxidant
      - e. Arbutin
        - i. tyrosinase inhibitor from plants, also inhibits melanosome maturation
        - ii. can cause paradoxical hyperpigmentation
      - f. Azelaic acid
        - i. tyrosinase inhibitor
        - ii. used for acne treatment, off-label hyperpigmentation treatment
      - g. Hydroxyphenoxypyruvic acid
        - i. high-potency lactic acid peel
        - ii. exfoliates hyperpigmented epidermal cells
    2. Blocks melanosome transfer: Niacinamide: Interrupts transfer of melanin from melanocytes to keratinocytes, also an antioxidant
    3. Breaks down pigmentation that is already present (bleach): Lignin peroxidase (Elure)
      - a. Produced by fungus and activated by hydrogen peroxide
      - b. Breaks down eumelanin
  - C. SPF protection: Physical blockers with zinc and/or titanium are preferable
  - D. Oral polypodium leucotomos extract (Heliocare): ferulic acid antioxidant that reduces photodamage from sun exposure
  - E. Multiple chemical peels
    1. Viable option, possibly with less risk of PIH
    2. See chemical peel in ablative resurfacing outline: AHAs, BHAs, TCA, Jessner's

## VI. Techniques

- A. Protective lenses worn by staff and patient because these devices can cause ocular damage.
- B. Laser measures: sign on door, consider smoke evacuator
- C. Skin may require open wound healing requiring cleansing with vinegar soaks and emollients, especially for ablative lasers—see outline.

## VII. Controversies

Should aestheticians be unsupervised in treating pigmented lesions when cancer is a risk?

## VIII. Pertinent Patient Management

- A. Postoperative instructions: If there is epithelial breakdown, consider vinegar soaks (1 cup water: 1 tsp distilled white vinegar) followed by emollient
- B. Medications: adjunctive topical treatment
- C. Other management considerations  
Patients should be aware that pigmented lesions could remain the same, improve, or, less likely, become more hyperpigmented; therefore diligent postoperative treatments described in section 5 should be followed for up to 6 months.

## IX. Complications

- A. Failure to improve
- B. PIH (nonresolution or possibly increased pigment)
- C. Inadvertent hypopigmentation, scar

## X. Historical Perspective

The device treatments for pigmented lesions have not changed much over the past 20 years other than the development of the nonablative fractional devices. There has been much research and advancement in the area of topical skin lighteners that can be used in conjunction with device treatments.

## XI. References and Additional Resources

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**Section 6: Tattoo Removal**

## I. Goal

- A. To shatter tattoo pigment within the dermis via a photoacoustic effect rather than a heating effect.
- B. Tattoo pigment can be ink used for elective or medical tattooing or deposited material from trauma such as lead, carbon, gunpowder.

## II. General Concepts

- A. 532 nm: red, yellow, orange ink
- B. 755 nm: blue, green ink
- C. 1064 nm: black ink
- D. Destruction of tattoo ink requires very short laser wavelengths: Q-switched (nanoseconds), picosecond lasers, or femtosecond lasers (under development).

## III. Indications and Contraindications

## A. Indications

1. Tattoo ink is the indication for treatment.
2. black and blue are removed more easily than green and purple ink. Yellow and orange are most difficult to remove.

## B. Contraindications

1. Relative
  - a. Patient expectations are important to manage because the treatment can take up to 1 year, multiple treatments, and can be expensive over time.
  - b. Current use of isotretinoin
2. Absolute
  - a. Active infection
  - b. Previous treatment with gold therapy (will cause hyperpigmentation that is irreversible)
  - c. Previous allergic reaction after laser tattoo removal

## IV. Preprocedure Evaluation

- A. Patient history: Who placed tattoo? Professional will have more ink than home or prison tattoos, which may have less ink and be easier to remove.
- B. Clinical examination
  - 1. Fitzpatrick skin type: Darker pigmented patients have more risk of PIH, longer-wavelength lasers are safer
  - 2. Description of the various tattoo colors
  - 3. Consider spot testing 4-6 weeks prior to full treatment.
- C. Preoperative documentation
  - 1. Preoperative photos
  - 2. History of allergic reaction to tattoo
  - 3. History of hyperpigmentation
  - 4. History of herpes infection
  - 5. History of keloids or easy scarring

## V. Alternatives to the Procedure

- A. Dermabrasion
- B. Surgical excision
- C. Microneedle pen

## VI. Lasers

- A. Q-switched: technology >15 years old, thus multiple versions
  - 1. QS 532 nm frequency doubled Nd:YAG
  - 2. QS 755 nm alexandrite
  - 3. QS 1064 nm Nd:YAG
- B. Picosecond: Create intraepidermal laser-induced optical breakdown (LIOB); only 3 on the market thus far:
  - 1. Cynosure: 755 nm/532 nm; 550-750 ps
  - 2. Cutera: 1064 nm/532 nm; 750 ps-2 ms
  - 3. Candela/Syneron: 1064 nm/532 nm; 450 ps/375 ps

## VII. Controversies

- A. Picosecond lasers are very expensive and were initially thought to be better to shatter the tattoo ink. Although some studies show that this is sometimes the case, often the Q-switched lasers work better.
- B. These short-pulsed lasers are also helpful for nevus of Ota

## VIII. Pertinent Patient Management in Terms of Treatment and Follow-up

- A. Appropriate eye protection for patient and staff: Use anodized metal plate/cup to protect eyes if goggles block the treatment area.

## B. Pain management

- 1. Pain can be significant.
- 2. Consider topical EMLA/Pliaglis, ice, and/or local infiltration.
- 3. Ensure area is dry before treatment.

- C. Treatment results may potentially be enhanced with a perfluorodecalin (PFD)-infused transparent patch (reduces post-treatment whitening to allow multiple passes, improves pigment clearing, epidermal protection). Fractional lens array can be attached to a picosecond lasers; delivers zones of injury, also provides resurfacing effect.
- D. Common patterns of response to treatment: Initial whitening, followed by erythema and sometimes blistering or scabbing). If doing multiple passes, the whitening must resolve prior to second pass.
- E. Postoperative instructions: Ointment and treat like an abrasion if there is pinpoint bleeding
- F. Discuss strategies of follow-up and secondary treatment with the patient

## IX. Complications

- A. Hypopigmentation
- B. Hyperpigmentation (more common in darker skin tones)
- C. Fibrotic scar
- D. Paroxysmal darkening of lighter colored tattoos (more common with Q-switched lasers and red ink)
- E. Allergy or inflammatory reaction, including urticarial, eczema, and granulomatous reactions. Occur most common with red-pigment and can cause anaphylactic reactions.

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XI. Photos



Figure 3

**Conclusion**

The field of cosmetic laser surgery is vast. Other important resources include the following:

- ASLMS.org
- Skincarecontroversies.com
- Cosmeticsurgeryforum.com
- Vegascosmeticsurgery.info



Figure 4



# What's New in the Treatment of Periocular Cancers: Hitting the High Notes

***Bita Esmaeli MD FACS***

In this lecture I will present clinical cases of locally advanced periorbital and orbital cancers that have been treated with neo-adjuvant drug therapy followed by surgery. Systemic immunotherapy and in some cases chemo/immunotherapy have been used to decrease tumor volume and allow for eye-sparing treatments.

# “Hit the Road Jack!” The Race to Cure Adenoid Cystic Carcinoma of the Lacrimal Gland

David T Tse MD FACS

## I. Introduction

Lacrimal gland adenoid cystic carcinoma (LGACC) is a rare orbital malignancy notorious for its unpredictability and universal, devastating lethality. It is the emperor of all orbital maladies and the king of terrors. The grim prognosis in achieving a cure for this disease is principally attributable to the complex regional orbital anatomy; the tumor's aggressive biological behavior, infiltrative growth pattern, distinct propensity for perineural infiltration with retrograde intracranial extension, and hematogenous dissemination; and delay in diagnosis. Intracranial involvement and metastatic disease are the principal causes of death.

This presentation aims to provide comprehensive follow-up data on a trimodal treatment strategy incorporating neoadjuvant intra-arterial cytoreductive chemotherapy (IACC) and to describe a precision orbital oncology toolbox bridging basic science, technology, and clinical practice.

## II. Neoadjuvant IACC for LGACC: A Long-term Follow-up Report of a Trimodal Strategy<sup>1</sup>

- A. Eight additional years of follow-up data on the same cohort of 19 high-risk and advanced tumor stage patients were initially reported in 2013.
- B. A study cohort maintaining a 100% follow-up with no dropouts
- C. Eight patients with an intact lacrimal artery, 7 with American Joint Commission on Cancer (AJCC) stage T4a-c, had significantly better overall survival (87.5% vs. 14.3% at 15 years), disease-specific mortality, and recurrences (all  $< .001$ , log-rank test) than prior conventionally treated bimodal therapy patients.
- D. Extended follow-up to a cumulative duration of 15 years supplemented with AJCC staging data supports neoadjuvant IACC as an integral component of a trimodal treatment strategy in patients with an intact lacrimal artery. Protocol elements implemented as designed appear to improve overall survival and decrease disease relapse.
- E. Positive tumor margins increased the risk of all-cause mortality 4.1 times ( $P = .036$ , stratified Cox proportional hazards regression) and disease-specific mortality 8.0 times ( $P = .043$ , stratified Cox proportional hazards regression) more than negative margins.

- F. This extended long-term IACC dataset suggests that a critical bar of at least 15 years of follow-up is appropriate for assessing the efficacy of current conventional and future globe-sparing bimodal therapies.

## III. Precision Orbital Oncology Toolbox

### A. Aims

1. To assess the tumoricidal effect of IACC-based strategy
2. To personalize evaluation of patient-specific LGACC molecular pathway signatures
3. To identify clinical and molecular clues for microscopic metastasis or prevention of metastasis
4. To tailor adjuvant therapies that specifically block molecular drivers of cancer cells

### B. Tools

1. LGACC cell culture line for each patient
2. Do the “omics”
  - a. Genomic: Mutational and gene expression profiling to identify molecular drivers of cancer cells and patients at risk for metastasis
  - b. Proteomic: Expression to identify therapeutic biomarkers
  - c. Transcriptomic: RNA-seq paved the way to explore the molecular mechanisms underlying a phenotype.
3. Pharmacologic library testing: High throughput screens to target specific tumor pathway
4. Transgenic animal model for pharmacologic library testing

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# In These Unprecedented Times . . .

## Oculofacial Plastic Surgery Subspecialty Day 2022

**Philip R Rizzuto MD FACS**

### Action Requested: Support Ophthalmology's Advocacy Efforts

Please respond to your Academy colleagues and be part of the community that contributes to OPHTHPAC®, the Surgical Scope Fund, and your State Eye PAC. Be part of the community that ensures ophthalmology has a strong voice in advocating for patients.

### Where and How to Invest

During AAO 2022 in Chicago, invest in OPHTHPAC and Surgical Scope Fund at either of our two convention center booths (in the Grand Concourse and Lakeside Center) or [online](#). You may also invest via phone by texting MDEYE to 41444 for OPHTHPAC and texting SCOPE to 51555 for the Surgical Scope Fund.

We also encourage you to support our congressional champions by making a personal investment to their re-election campaign via [OPHTHPAC Direct](#), a unique and award-winning program that lets *you decide* who receives your political support.

Surgical Scope Fund contributions are completely confidential and may be made with corporate checks or credit cards. PAC contributions may be subject to reporting requirements.

### Why Invest?

Academy Surgical Scope Fund contributions are used to support the infrastructure necessary in state legislative/regulatory battles and for public education. OPHTHPAC investments are necessary at the federal level to help elect officials who will support the interests of our profession and our patients. Similarly, state Eye PAC contributions help elect officials who will support the interests of our patients at the state level. Contributions to EACH of these three funds are necessary and help us protect sight and empower lives.

Protecting quality patient eye care and high surgical standards is a “must” for everybody. Our mission of “protecting sight and empowering lives” requires robust funding of both OPHTHPAC and the Surgical Scope Fund. Each of us has a responsibility to ensure that these funds are strong so that ophthalmology continues to thrive and patients receive optimal care.

### OPHTHPAC for Federal Advocacy

OPHTHPAC is the Academy's award-winning nonpartisan political action committee, representing ophthalmology on Capitol Hill. OPHTHPAC works to build invaluable relationships with our federal lawmakers to garner their support on issues such as:

- Improving the Medicare payment system, so ophthalmologists are fairly compensated for their services

- Securing payment equity for postoperative visits, which will increase global surgical payments
- Stopping optometry from obtaining surgical laser privileges in the veterans' health-care system
- Reducing prior authorization and step therapy burdens

Academy member support of OPHTHPAC makes all this possible. Your support provides OPHTHPAC with the resources needed to engage and educate Congress on our issues, helping advance ophthalmology's federal priorities. Your support also ensures that we have a voice in helping shape the policies and regulations governing the care we provide. Academy member support of OPHTHPAC is the driving factor behind our advocacy push, and in this critical election year, we ask that you get engaged to help strengthen our efforts.

At the Academy's annual Mid-Year Forum, the Academy and the American Society of Oculofacial Plastic & Reconstructive Surgery (ASOPRS) ensure a strong presence of oculofacial plastic surgery specialists to support ophthalmology's priorities. As part of this year's meeting, ASOPRS supported participation of fellowship trainees via the Academy's Advocacy Ambassador Program. During Congressional Advocacy Day, they visited members of Congress and their key health-care staff—either in person or virtually—to discuss ophthalmology priorities. The ASOPRS remains a crucial partner with the Academy in its ongoing federal and state advocacy initiatives.

### Surgical Scope Fund for State Advocacy

The Surgical Scope Fund (SSF) provides grants to state ophthalmology societies in support of their efforts to protect patient safety from dangerous optometric surgery proposals. Since its inception, the Surgery by Surgeons campaign and the SSF, in partnership with state ophthalmology societies, have helped 43 state/territorial ophthalmology societies reject optometric scope-of-practice expansions into surgery.

If you have already made a SSF contribution, please go to [safesurgerycoalition.org](#) to see the impact of your gift.

Dollars from the SSF are critical to build complete cutting-edge political campaigns, including media (TV, radio, and social media), educating and building relationships with legislators, and educating the voting public to contact their legislators. This helps to preserve high surgical standards by defeating optometry's surgical initiatives.

Each of these endeavors is very expensive, and no one state has the critical resources to battle big optometry on their own. Ophthalmologists must join together and donate to the SSF to fight for patient safety.

The Academy's Secretariat for State Affairs thanks ASOPRS, which has joined state ophthalmology societies in contributing to the SSF. These ophthalmic organizations complete the necessary SSF support structure for the protection of our patients' sight.

Surgical Scope Fund	OPHTHPAC®	State Eye PAC
To protect patient safety by defeating optometric surgical scope-of-practice initiatives that threaten quality surgical care	Support for candidates for U.S. Congress	Support for candidates for state House, Senate, and governor
Political grassroots activities, government relations, PR and media campaigns	Campaign contributions, legislative education	Campaign contributions, legislative education
No funds may be used for campaign contributions or PACs.		
Contributions: Unlimited	Contributions: Personal contributions are limited to \$5,000.	Contribution limits vary based on state regulations.
Individual, practice, corporate, and organization	Corporate contributions are confidential.	
Contributions are 100% confidential.	Personal contributions of \$199 or less and all corporate contributions are confidential.	Contributions are on the public record depending upon state statutes.
	Personal contributions of \$200 and above are on the public record.	

### State Eye PAC

The presence of a strong State Eye PAC providing financial support for campaign contributions and legislative education to elect ophthalmology-friendly candidates to the state legislature is critical, as scope-of-practice battles and many regulatory issues are fought on the state level.

### Support Your Colleagues Who Are Working on Your Behalf

Two Academy committees made up of your ophthalmology colleagues are working hard on your behalf. The OPHTHPAC Committee continues to identify Congressional Advocates in each state to maintain close relationships with federal legislators to advance ophthalmology and patient causes. The Surgical Scope Fund Committee is raising funds used to protect Surgery by Surgeons during scope battles at the state level.

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# External Levator Advancement: The Leader of the Band

**John B Holds MD**

- I. Blepharoptosis, commonly referred to by eyelid surgeons as “ptosis,” comes from the Greek word for “falling.”
- II. Repair Techniques for Ptosis
  - A. Levator-dependent technique: Anterior vs. posterior approaches are possible, although most surgery in current era is done anteriorly.
    1. Levator aponeurotic resection: Below or up to Whitnall ligament, medial and lateral horn of the levator generally left intact
    2. Levator resection: Levator aponeurosis and possibly levator brought up as a sheet, with cutting or the medial and lateral horns of the levator aponeurosis
  - B. Posterior resection techniques: Generally not viewed as levator-dependent, although Allan Putterman MD believes Müller muscle-conjunctival resection (MMCR or Putterman procedure) is a posterior levator resection.
    1. Fasanella-Servat or other posterior tarsal resection
    2. MMCR/Putterman müllerectomy
  - C. Frontalis sling: Connection of eyelid to forehead via a sling, made of various materials including autogenous or banked fascia, suture materials or silicone rod/band
- III. Patient Evaluation
  - A. History to determine time course, chronicity, and stability of ptosis, rule out myasthenia gravis or familial/other myopathy, ascertain effectiveness of eye-protective reflexes and possible dry eye
  - B. Examination noting:
    1. Vision
    2. Eyelid height (margin reflex distance 1) of each eye
    3. Levator function of each eye
    4. Lower eyelid position
    5. Bell’s phenomenon
    6. Absence of fatigability. If fatigues, needs lab work and possibly neuro consult.
    7. Basic Schirmer testing and slit-lamp examination to determine any dry eye or exposure
    8. Concomitant conditions such as dermatochalasis, brow ptosis
- IV. Surgical Planning
  - A. Anterior-approach aponeurotic surgery for ptosis is appropriate for most patients with:
    1. 4 mm or more of levator function and an ability to either adjust eyelid height and contour intraoperatively or
    2. In children with large levator aponeurotic resections repaired under general anesthesia
    3. In congenital or other neuro/myogenic ptosis, it may be necessary to add an external tarsectomy to the maximal aponeurotic resection. This is a specialized technique detailed in a manuscript referenced below.
  4. Advantages
    - a. Anatomic approach to the principal elevator of the eyelid
    - b. Directly repairs the anatomic defect in aponeurotic ptosis
    - c. Applicable in all types of ptosis, sparing frontalis sling surgery for very poor levator function ptosis
    - d. Eyelid height and contour widely adjustable intra- and postoperatively
  5. Disadvantages
    - a. Requires comprehensive understanding of ptosis, ptosis surgical anatomy, intensive training, and experience for optimal results
    - b. The possibility of a postoperative adjustment may obligate the surgeon to “adjust” the eyelid height or contour upward or downward in the office postoperatively.
  - B. Posterior approach surgery
    1. Fasanella-Servat technique is still favored by a number of surgeons, but most ptosis surgeons use one of the other described techniques. Variations on the technique with external or internal approaches to tarsectomy are used in treating residual or segmental ptosis (referenced below).
    2. Putterman müllerectomy (MMCR) is widely employed as a practical, formulaic and somewhat predictable approach to ptosis repair.

3. Advantages of posterior approaches
  - a. Formulaic approaches with result predicted by a surgeon's nomogram or results of phenylephrine testing
  - b. Technically simple to perform
  - c. May be performed under general anesthesia without patient cooperation
  - d. Limited ability to adjust result postoperatively removes the onus from the surgeon to do so.
4. Disadvantages of the posterior approach
  - a. Nonanatomic approach to anatomic defects
  - b. Limited range of correction
  - c. Limited options to adjust if the result isn't exactly as desired
  - d. Sacrifice of goblet cells and minor lacrimal glands may create dry or irritated eye.
  - e. Scarring may make further surgery difficult.
  - f. Formulaic simplicity may encourage the performance of inappropriate procedures by inappropriate surgeons.

#### C. Frontalis sling repair

Generally reserved for eyelids with poor levator function in children or individuals with severe myopathy affecting the levator aponeurosis

### V. Surgical Technique: Levator Aponeurotic Resection

#### A. Anesthesia and skin incision

1. Intravenous sedation with short-acting medications or anxiolytics will help many patients. Children typically undergo general anesthesia.
2. A central eyelid crease incision 12 mm in width suffices for small-incision surgical techniques. A larger incision for upper blepharoplasty can be made, and orbicularis muscle and the orbital septum initially opened in the central 12 mm.
3. A larger incision is made for cases requiring larger and more extensive repairs of the levator aponeurosis, as in congenital ptosis.
4. Injection with 0.2 mL of 2% lidocaine with epinephrine 1:100,000 will provide generally adequate local anesthesia.

#### B. Opening of the orbital septum and exposure of the levator aponeurosis

1. The superior edge of the opened orbicularis muscle is pulled upward and away from the eye, creating the superior plane that is opened to reach the (generally superiorly located) levator aponeurosis.
2. After exposing the preaponeurotic fat, the levator aponeurosis is inspected and then (generally) thinned aponeurosis resected over the upper tarsus.

3. The presenter prefers to create a horizontal groove across the central upper tarsus 2 mm below its superior margin to 50% tarsal depth. This creates a stable attachment point for sutures to the aponeurosis.
4. Additional topical proparacaine into the eye and incision will provide better anesthesia for aponeurotic suture placements into the tarsus.
5. An appropriate resection of the thinned levator aponeurosis near the upper tarsus will create an appropriate edge for suturing.

#### C. Suturing the aponeurotic defect

1. Sutures used for aponeurotic repair: In most cases, 5-0 Vicryl on a S-14 needle (Ethicon, first 30 years), or more recently a 6-0 silk, G-1 or G-6 needle (Ethicon), has been slightly more accurate, with fewer dropped eyelids in the postoperative period.
2. Sutures are passed from the distinct inferior cut edge of the levator aponeurosis through the tarsus at 50% tarsal depth, using the groove to vertically position the suture entry point into the tarsus. A bow knot is tied.

#### D. Checking the eyelid height

1. Eye shields are removed, and conscious patients will be asked to wake up, open their eyes, and fixate on the surgeon's finger, with or without head elevation.
2. In children under general anesthesia, the gaping of the eyelid margin and induced lagophthalmos is used as a surrogate for an awake patient consciously opening their eyelids.

#### E. Final adjustments of eyelid height: Slip knots tightened or loosened to achieve target height

1. Symmetry at appropriate height for bilateral repairs, 1 mm above expected final eyelid height
2. For unilateral cases, aim for a 1-1.5 mm over-correction of eyelid height in primary gaze.
3. 2-4 aponeurotic sutures are placed, although in congenital ptosis with large aponeurotic resections and poor levator function 5-6 sutures may be used.

#### F. Closure and postoperative care

1. If desired, a blepharoplasty or other procedure may be performed at this time.
2. A 6-0 monofilament (nylon or polypropylene) suture can generally close the wound in a running fashion.
3. Elevation, ice, and mild analgesics are appropriate for 24-48 hours postoperatively. Antibiotic ointment may be applied to the incision, and to the eye if needed, at bedtime due to exposure symptoms. Artificial tear drops are used 2-6 times/day as indicated for exposure symptoms.

4. Follow-up is generally at 7-10 days, with inspection of the patient's eye.
5. Minimal asymmetries (0.5 mm or less) may be amenable to massaging the patient's eyelid. Larger under- or overcorrections of eyelid height may require removal of 1 or more aponeurotic bites to lower the eyelid, or placement of a new bite to raise the eyelid. This office adjustment procedure is done in the first 6-13 days post-operatively with a tiny flash of subcutaneous local anesthetic, retraction of the skin edges to bluntly open the skin incision, and dissection of the relevant anatomy with silk suture placement or removal.

#### VI. Conclusion

Anterior approaches to ptosis repair are surgically more challenging than the MMCR procedure and require comprehensive, intensive surgical training and experience. Nonetheless, the broad applicability of anterior approaches and the enhanced surgical results and options make it the approach of choice in most patients.

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# Conjunctival Müller Muscle Resection

## Rhythms and Blues

Daniel B Rootman MD MSc

### Introduction

In general, there are three approaches to ptosis surgery: frontalis suspension, anterior levator and Müller muscle–based surgery. None are completely pure, each involving aspects of other techniques, despite predominantly focusing on one eyelid elevator or another. Not surprisingly, other than frontalis approaches, there is considerable overlap in the indications for and efficacy of both levator and Müller muscle ptosis surgery. In most cases, surgery by any approach follows an expected rhythm, with predictable and pleasing outcomes. However, symphonic incursion is not an uncommon happenstance, and some cases do not follow the expected refrain. In this discussion we will observe the expected melodies of ptosis surgery, and the unexpected interference of outside noise.

### Observations

The majority of involutional ptosis cases can be managed effectively with either levator or Müller muscle surgery. There is evidence in the literature relating the relative equivalence of these two procedures.<sup>1</sup> The levator approach, being older, has a wider traditional indication. However, the Müller muscle approach has over time been shown to have a similar breadth of indication, including contact lens ptosis, Horner syndrome, severe ptosis, congenital ptosis, phenylephrine-negative patients, and ptosis in glaucoma.<sup>2–7</sup> Additionally, parity in combined surgery has been met, where Müller muscle and levator surgery are both known to be effective in cases of combined ptosis and blepharoplasty cases<sup>8</sup> as well as in association with other eyelid procedures. For the vast majority of these varied indications, ptosis surgery follows an expected pattern and is highly effective.

Despite the efficacy and predictability of ptosis surgery in a wide array of indications, there are cases that do not proceed according to plan. These cases are difficult to predict, and frustrating to both clinician and patient. Both levator and Müller muscle surgery are subject to these variations, though slightly different in character—levator surgery mostly by contour abnormalities and overcorrection and Müller surgery by undercorrection and fornix abnormalities.<sup>1</sup> In both cases, predictive modeling has been disappointing in identifying risk factors for unexpected outcomes. Case selection and surgeon skill are also poorly predictive.<sup>9</sup> This small region of underpredictability has frustrated surgeons endlessly, classically leading to the description of ptosis surgery as “Hell.”

These variations on the theme of melodic ptosis surgery offer insight into the complexity of ptosis physiology and the mechanisms for repair. Observations regarding eyelid physiology suggest complex anatomic-physiologic relationships, with many mysteries yet to unravel. That is why we keep listening, to make music out of noise.

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# Conjunctival Müller Muscle Resection Improvisations

**Morris E Hartstein MD**

The conjunctival Müller muscle resection (MMCR) procedure has been a time-tested and reliable surgery for the correction of ptosis. We have recently modified this technique to further enhance its applications.

We have developed a consistent and effective modification for the MMCR in which sutures are not required. The sutureless MMCR is a rapid, safe, and reliable procedure.

In addition, we have demonstrated that MMCR, when combined with tarsectomy, can be an effective procedure in children with congenital ptosis and fair levator function. This provides a useful alternative to the standard procedures of levator resection or frontalis sling, with a rapid recovery.

These modifications, as well as the results from our studies, will be presented.

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# The Newest Member of the Band: Frontalis Muscle Advancement

***Bobby Korn MD PhD FACS***

Congenital ptosis is often characterized by poor levator function. In this setting, frontalis coupling surgery is the preferred treatment modality. A variety of sling materials have been described over the years, including autologous/donor fascia lata, silicone rod, and permanent sutures. More recently, frontalis advancement muscle flaps have been utilized for congenital ptosis. This technique has multiple advantages: autologous, direct coupling of the frontalis muscle to the tarsus, and long lasting. This lecture describes the author's preferred approach.

# All About the Bass: Scoring With Tarsectomy

**Cat Burkat MD FACS**

## I. Introduction

Various techniques are available for ptosis correction, with the common theme that the choice primarily depends on levator function.

## II. Review of Techniques Recommended per Levator Function

## III. Concerns Regarding Tarsectomy

## IV. Surgical Technique, and Limitations of Levator Resection

## V. Options for Additional Elevation Utilizing Tarsectomy Techniques, via Anterior and Posterior Approaches

## VI. Advantages and Disadvantages of Each Technique

## VII. Results and Importance of Tarsal Base

## Selected Readings

1. Pak J, Shields M, Putterman AM. Superior tarsectomy augments super-maximum levator resection in correction of severe blepharoptosis with poor levator function. *Ophthalmology* 2006; 113(7):1201-1208. This article by Putterman's group showed that in patients with poor levator function (<5 mm), a superior tarsectomy significantly decreased the incidence of undercorrection (MRD1 < 2.0 mm) compared with super-maximum levator resection alone (12.5% vs. 70%;  $P = .023$ ).
2. Gazit I, Gildener-Leapman J, Or L, Burkat CN, Pras E, Hartstein ME. Müller's muscle-conjunctival resection combined with tarsectomy for treatment of congenital ptosis. *Ophthalmic Plast Reconstr Surg*. 2019; 35(6):619-622. The series by Hartstein et al showed a mean improvement in MRD of 2.79 mm in patients with congenital ptosis with 5-10 mm of levator function.
3. Tran AQ, DeMaria LN, Nair AA, Tooley AA, Godfrey KJ, Lisman RD. Adjustable ptosis correction via posterior levator advancement with minimal superior tarsectomy. *Ophthalmic Plast Reconstr Surg*. 2021; 37(1):86-90. A more recent study by Lisman et al similarly showed an MRD improvement of 2.5 mm using a posterior approach and tarsectomy. Postop complications included dry eyes that resolved by 3 months (13.6%) and surgical revision (2.8%).

# External Dacryocystorhinostomy: You're Singing My Tune

## Is External Dacryocystorhinostomy Still the Gold Standard in 2022?

**Michael John Hawes MD FACS**

The author will review his personal technique in performing external dacryocystorhinostomy (DCR), with emphasis on using a tear trough incision, making a generous osteotomy (no bone closer than 5 mm to the common canaliculus), widely opening the lacrimal sac, and creating posterior and anterior flaps. A video of DCR surgery will illustrate the technique.

Two separate (2001 and 2019) reports by the American Academy of Ophthalmology mention that there are disadvantages to endonasal DCR: general anesthesia, expensive instrumentation, and a steep learning curve. Mention is made that endonasal laser DCR (but not necessarily endo with drill or rongeurs) was less effective than the “gold standard external DCR.”

Other anatomical research has also suggested that it may be more difficult to remove bone superiorly with the endonasal approach.

External DCR gives unsurpassed exposure of anatomy, which allows for generous bone removal, especially around the internal common punctum, and removal of ethmoid air cells. In addition, external DCR makes it easier to deal with canalicular obstructions and diverticula. It is the preferred approach to address eyelid anomalies such as telecanthus. Furthermore, the external DCR establishes an immediate mucosal-lined fistula between lacrimal sac and nose, whereas endo DCR may be more likely to result in fibrosis and ring contracture due to secondary healing. External DCR may be done with local anesthesia with sedation in many cases. There is minimal postop care. The instrumentation is not complicated. External DCR is the preferred approach in cases of suspected lacrimal sac tumor. It is the more suitable approach in the midfacial trauma patient and in patients with craniofacial anomalies.

Often mentioned as a disadvantage of external DCR is the skin scar. This can be minimized with a tear trough incision. In our paper describing this incision, 60 out of the 72 patients graded the scar as invisible (83.3%), 9 (12.5%) felt it was minimally visible, and only 3 patients graded the scar as moderately visible (4.2%). No patients graded the scar as very visible.

Another reported disadvantage of external DCR is disruption of the blink and lagophthalmos. In a 2009 study by Vagefi et al, among 215 patients and 247 surgeries, 16 individuals (7.4%) were identified who demonstrated abnormalities of eyelid closure in the postoperative period after external DCR. Resolution of lagophthalmos was seen on average by 14 weeks in the 7.4% of patients who developed this complication.

In summary, external DCR remains the gold standard. The many advantages enumerated above outweigh the minor disadvantages for most patients.

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# Endoscopic Dacryocystorhinostomy: Swinging It From the Inside

***Bradford William Lee MD MSC***

## NOTES

[illegible]

# Take Five: Pediatric Tumor Notes to Remember

**William R Katowitz MD**

## Summary

1. Beware of the *lack* of pain.
2. CT alone can be misleading.
3. Diffusion weighted imaging with MRI
4. Not everything needs to be biopsied.
5. Cysts can be deceiving.

## Outline

- I. Beware of the *lack* of pain.
  - A. Orbital rhabdomyosarcoma typically does not present with pain (~10% of pediatric patients; Punyko JA, et al. *Cancer* 2005; 103, no. 7).
  - B. While pain can occur in the setting of neoplasms, this is more often seen when the bony orbit is involved (eg, Langerhans cell histiocytosis, neuroblastoma).
- II. CT alone can be misleading.
  - A. While CT imaging is faster, cheaper, and great for imaging of the bony orbit, it poorly differentiates soft tissue tumors from other non-neoplastic masses such as inflammations and malformations.
  - B. MRI is critical in aiding the diagnosis of orbital lesions.
  - C. It spares a patient radiation exposure.
  - D. MRI also carries the benefit of post-gadolinium contrast imaging.
- III. Diffusion Weighted Imaging (DWI) With MRI
  - A. DWI with apparent diffusion coefficient series (apparent diffusion coefficient [ADC]) is extremely helpful in recognizing packed cells suspicious for neoplasm.
  - B. Restriction on an ADC map can be misleading, as this is seen in dermoid cysts and with abscesses.
- IV. Not everything needs to be biopsied.
  - A. While surgical biopsy is the most definitive procedure for tissue diagnosis, surgery can be avoided with certain lesions with a great deal of confidence.
  - B. This is true for such lesions as
    1. Optic nerve gliomas
    2. Vascular malformations (venous, lymphatic, lymphaticovenous)
    3. Metastasis
- V. Cysts can be deceiving.
  - A. Some neoplasms can have cysts due to rapid cell growth and necrosis.
  - B. Correlation with proper imaging (MRI with contrast, perfusion scans, and DWI sequences) is critical to help make the decision to proceed with surgical biopsy.

# Biologics for Thyroid Eye Disease: What's New? What's Next?

**Rona Z Silkiss MD FACS**

- I. Graves Disease
  - A. Graves endocrinopathy or thyroidopathy
  - B. Graves ophthalmopathy
  - C. Graves dermopathy
  - D. CNS changes
- II. U.S. Graves Disease Statistics, 332,403,650 Population
  - A. The overall prevalence of hyperthyroidism is 1.2% (398,923).
  - B. The annual incidence is 20/100,000 to 50/100,000 (2%-3%).
  - C. The prevalence of thyroid eye disease (TED) is 0.25% (83,100).
  - D. The incidence of TED is 16/100,000 females and 2.9/100,000 males.
- III. Pathogenesis of TED
  - A. Genetic *and* environmental factors
  - B. Humoral and cell-mediated immunity (B and T cells)
  - C. Orbital fibroblasts seem to be the key mediators.
  - D. Immunological cross-reactivity between thyroid and orbital tissue antigens (TSH receptor)
  - E. Orbital TSH receptor hyperstimulation leads to glycosaminoglycan secretion by preadipocyte fibroblasts and an increase in the volume of intraorbital tissues.
  - F. Eye muscles, connective tissue, and fat are infiltrated by lymphocytes and are the target of acute inflammation.
- IV. Rituximab (RTX)
  - A. RTX blunts the active inflammatory phase, inducing a 4-6+ month B cell depletion with no change in serum immunoglobulins.
  - B. RTX-induced depletion orbital B cells may interfere with antigen presentation and T cells.
- V. Monoclonal antibodies affect distinct positions of the TED inflammatory cascade to prevent fibroblast proliferation and disease progression.
- VI. Tocilizumab
  - A. Recombinant humanized IgG1 monoclonal antibody to the IL-6 receptor
  - B. Inhibits IL-6 signaling
- C. Approved for the treatment of active moderate to severe rheumatoid arthritis unresponsive to standard therapy
- D. Dosing: 162 mg subcutaneously every week or 4 mg/kg IV every 4 weeks with possible increase to 8 mg/kg every 4 weeks
- E. Monitor for neutropenia, thrombocytopenia, elevated liver function tests, lipid abnormalities
- F. Improved clinical activity score, thyroid-stimulating immunoglobulin levels, proptosis, extraocular motility, visual acuity
- VII. IGF-1
  - A. IGF-1 consists of 70 amino acids in a single chain with 3 intramolecular disulfide bridges. IGF-1 has a molecular weight of 7649 Daltons.
  - B. Protein that in humans is encoded by the *IGF1* gene
  - C. Hormone similar in molecular structure to insulin. It plays a key role in childhood growth and continues to have anabolic effects in adults.
  - D. Expressed in nearly every organ system
- VIII. Teprotumumab for the Treatment of Active TED
- IX. Teprotumumab Efficacy, Safety, and Durability in Longer-Duration TED and Retreatment: OPTIC-X Study
- X. Comparison of Biologics
- XI. Overview of the TED Pipeline
- XII. Local vs. Systemic Effect on Disease
  - A. Disease modulators
    - 1. IV steroids
    - 2. Teprotumumab
    - 3. Tocilizumab
  - B. Disease modifiers
  - C. IV steroids
  - D. Rituximab
  - E. XRT
  - F. Apitopes ATX-GD-59
  - G. Blocking TSHR-Ab K1-70
  - H. BAFF inhibitor, belimumab
  - I. Anti-CD40 antibody, iscalimab

## XIII. Key Points

- A. Biologics are promising agents for the treatment of TED.
  - B. Glucocorticoids, rituximab, tocilizumab, and teprotumumab appear to be effective for TED to varying degrees.
  - C. All biologics have side effects, some more serious and common than others, ie, hearing loss (IGF-1R inhibitors).
  - D. There is no evidence that we have achieved the optimal drug for TED.
  - E. The timing of infusion in the cycle of the disease (early) is a critical feature of drug efficacy.
  - F. Method of administration and dosing to limit serious adverse effects are critical to success of drug.
  - G. Research on optimal drug, timing of treatment, and dosing with head-to-head drug comparisons is needed.
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# Smooth Operator! Surgery for Thyroid Eye Disease

**Michael Kazim MD**

- I. Timing
  - A. Acute: CON or corneal decompensation
  - B. Stable: 6+ months of unchanged thyroid eye disease (TED) metrics
- II. Order
  - A. Classic: Seiff serial approach
    - 1. Decompression
    - 2. Strabismus
    - 3. Eyelid
  - B. Modern: Where possible combined
    - 1. Decompression + extraocular muscles (EOM) + eyelid
    - 2. EOM + eyelid
- III. Pearls for Increased Success
  - A. Graded decompression based on:
    - 1. Desired decompressive effect
    - 2. Size of EOMs
    - 3. Sinus size/pathology
    - 4. Tolerance of new strabismus
    - 5. Risk stratification: medial/floor > lateral > fat
  - B. Strabismus surgery
    - 1. Stable measurements for 6 months
    - 2. Careful preop orthoptics measurements
    - 3. Intraop forced ductions
    - 4. Adjustable sutures for all but inferior rectus
    - 5. Tenon recession to improve both primary gaze outcomes and ductions
    - 6. Lateral rectus resection for residual esotropia
  - C. Upper eyelid surgery
    - 1. Modified full-thickness blepharotomy to improve lid contour
    - 2. Subcuticular closure
  - D. Lower lid surgery
    - 1. Requires spacer graft choice per degree of retraction
    - 2. Tarsoconjunctival free graft
    - 3. Ear cartilage
    - 4. Oral mucosal graft
    - 5. Traction Frost suture for 1 week

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# Take It Up an Octave! Elevating Your Treatment of Thyroid Eye Disease

## Surgical Approaches to TED

Sara Tullis Wester MD

### I. Decompression Approach

- A. Brief review of anatomy
- B. Review of approaches with a focus on medial and lateral
  1. Which approach has better proptosis reduction?
  2. Benefits/risks of each
  3. Decision tree
  4. Predicting outcomes?
- C. Fat decompression

### II. Surgical Timing

- A. Has our approach changed with Tepezza in terms of surgical timing?
- B. ? Reactivation risk
- C. Managing risk of regression of some proptosis

### Selected Readings

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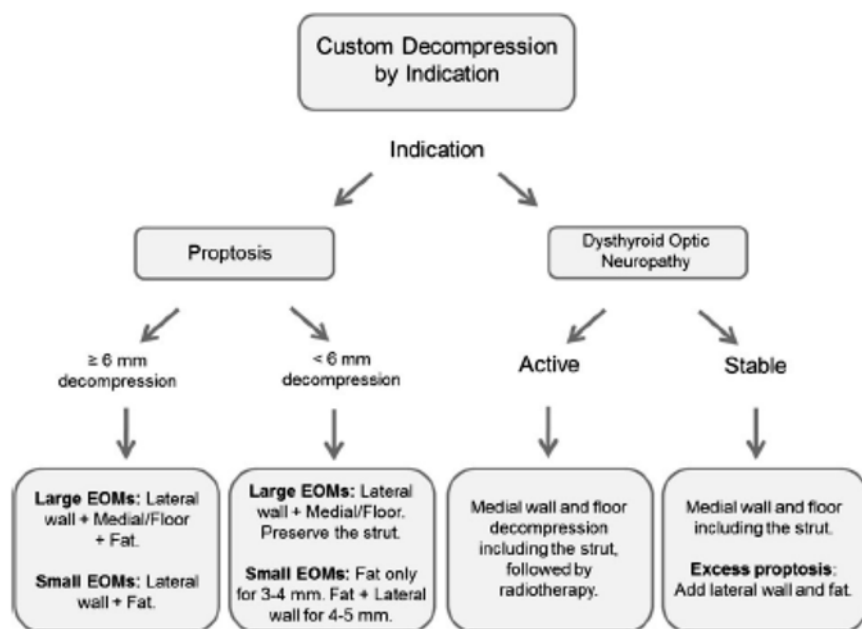


Figure 1

# Dynamics and Challenges in Managing Eyelid Retraction

**Erin M Shriver MD**

- I. Eyelid Retraction Etiology
    - A. Anatomic causes of eyelid retraction in thyroid eye disease (TED)
    - B. The physics of eyelid retraction using a vector force model
  - II. Clinical Implication of Eyelid Retraction
    - A. Clinical exam findings
    - B. Treatment of clinical signs and symptoms
  - III. The Aesthetics of Eyelid Retraction and Repair
    - A. Aesthetic ratios in the periocular region
    - B. Alteration of periocular aesthetic ratios in TED
    - C. Tarsal platform show in eyelid retraction
  - IV. Measuring and Documenting Eyelid Retraction
    - A. Challenges of measuring eyelid position in clinic
    - B. Challenges of documenting and measuring eyelid position with photography
  - V. The Effect of Medical Treatment of TED on Eyelid Position
  - VI. Botulinum Toxin for Eyelid Retraction Associated With TED
  - VII. Surgical Repair of Eyelid Retraction Associated With TED
    - A. Levator recession with müllerectomy
    - B. The pros and cons of septum preservation
    - C. Full-thickness blepharotomy
    - D. Lowering the lid while minimizing tarsal platform show elongation
    - E. Adjunctive procedures—temporary or permanent tarsorrhaphies
- ### Selected Readings
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# Upbeats on the Use of Sclerosing Agents in Lymphatic Malformations

*Lilangi Ediriwickrema MD*

- I. Lymphatic Malformations (LM)
  - A. Typically rare low-flow vascular malformations
  - B. Irregular vascular spaces lined with lymphatic endothelial cells (LEC)
  - C. Subtypes: macrocystic (>1 cm), microcystic (<1 cm), or mixed
  - D. Cysts can be empty or made up of protein-rich fluid
- II. Occur in 1 in 2000-4000 Births
  - A. Comprise 25% of all vascular lesions
  - B. Up to 75% of LM are cervicofacial.
  - C. Associated with Turner, Proteus, CLOVES (congenital lipomatous overgrowth, vascular malformations, epidermal nevi, and scoliosis/skeletal/spinal anomalies), and other syndromes
- III. Orbital LM typically present as spontaneous hemorrhage in children <16 years
  - A. Physical exam
    1. Asymptomatic, proptosis, restrictive strabismus, pain, vision loss, ptosis, globe dystopia
    2. Adjacent skin can be unaffected, have papules, or vascular marks (ie, capillary malformations)
    3. Wax/wane in size due to infection, inflammation, hemorrhage, or trauma
  - B. Diagnosis: clinical exam and neuroimaging (ultrasound + MRI)
- IV. Treatment of Orbital LM
  - A. First-line approach
    1. Observation
    2. Smaller, less disfiguring lesions: ~45% regress spontaneously
  - B. Macrocystic lesions: Consider sclerosing agents
    1. Most have excellent to fair response
    2. Adverse reactions: soft tissue edema that can cause airway obstruction, skin necrosis, neuropathy
- C. Life- or sight-threatening disease, sclerotherapy-resistant lesions, or microcystic lesions
  1. Consider sirolimus or surgery
  2. Surgery: Lesions can recur with incomplete resection, surgical risks associated with deeper lesions, lesions can revascularize and recur, recommend performing at dedicated facility/tertiary care center
- V. Sclerosing Agents
  - A. Bleomycin: Induces DNA strand breaks and inhibits cellular synthesis
  - B. Doxycycline: Tetracycline metallomatrix proteinase inhibitor, suppresses VEGF-induced lymphangiogenesis
  - C. Ethanol: Cellular dehydration of endothelial cells
  - D. Picibanil (OK-432): Promotes inflammatory cascades
  - E. Pingyangmycin: Destruction of endothelial cells and increased collagen deposition
  - F. Sodium tetradecyl sulfate: Detergent that emulsifies cell membrane lipoproteins and increases transmembrane permeability
- VI. Sclerosing Agents: Efficacy
  - A. Macrocystic lesions: Mono or combination therapy with doxycycline, bleomycin, and sodium tetradecyl sulfate (STS)
  - B. Microcystic lesions: Bleomycin and doxycycline
  - C. Mixed lesions: Monotherapy with doxycycline or bleomycin and combination therapy of doxycycline, bleomycin, and STS
- VII. Future Directions
  - A. Sildenafil
  - B. Sirolimus (mTOR inhibitor rapamycin)
    1. PERFORMUS trial (2021): Decreased volume of pure LM; improved pain, less bleeding, and improved quality of life, especially in combined malformations
    2. VASE: a Phase 3 multicenter study evaluating the efficacy and safety of sirolimus in vascular anomalies that are refractory to standard care

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# Orbital Cellulitis: Have We Modulated to a New Key?

**Michael T Yen MD**

- I. Introduction
  - A. Definition and classification of orbital cellulitis
  - B. Different types of orbital cellulitis
- II. Microbiology of Orbital Cellulitis
  - Historical and current evolution
- III. Clinical Presentation
  - A. Constitutional signs/symptoms
  - B. Ophthalmic presentation (vision, motility, pupillary exam, exophthalmos)
- IV. Radiographic Imaging and Diagnostic Studies
- V. Medical Treatments for Orbital Cellulitis
- VI. Surgical Treatments

- VII. Impact of COVID-19 on Orbital Cellulitis
  - A. Associated peak in emergency room visits
  - B. Atypical season of presentation
  - C. Microbiology
  - D. Incidence of surgical intervention

## VIII. Summary

### Selected Readings

1. Garcia GH, Harris GJ. Criteria for nonsurgical management of subperiosteal abscess of the orbit: analysis of outcomes 1988-1998. *Ophthalmology* 2000; 107(8):1454-1456; discussion 1457-1458.
2. Thyparampil PJ, Yen MT. Clinical evaluation of the infected orbit. In: Yen MT, Johnson TE, eds. *Orbital Cellulitis and Periorbital Infections*. New York: Springer; 2018:11-22.
3. Turbin RE, Wawrzusin PJ, Sakla NM, et al. Orbital cellulitis, sinusitis and intracranial abnormalities in two adolescents with COVID-19. *Orbit* 2020; 39(4):305-310.

# Management of Complex Orbital Tumors

***Jorge Corona MD***

- The purpose of this lecture is to discuss the management of complex orbital tumors.
- Orbital tumors are sometimes difficult to manage. The orbit is a very tight space, full of vital structures. Multi-disciplinary management of these tumors is sometimes necessary to obtain the best results.
- Some of these cases were performed during humanitarian medical mission trips.
- With good planning and preparation good outcomes can be obtained.

# When It's Hot, It's Hot! Idiopathic Orbital Inflammation

*Robert C Kersten MD*

## NOTES



# OMIC: How to Stay On Key and Keep From Going Flat!

## Medicolegal Issues in Blepharoplasty and How to Avoid Them: The OMIC Experience

**Ron W Pelton MD PhD**

### I. Clinical Complications

- A. Hematoma
- B. Chemosis
- C. Lid malposition
  - 1. Ptosis
  - 2. Lower lid retraction
- D. Lagophthalmos
- E. Brow ptosis
- F. Diplopia
- G. Blindness

### II. Malpractice vs. Maloccurrence

- A. Malpractice
- B. Maloccurrence

### III. Why Patients Sue

- A. Poor communication
- B. Billing disputes and financial issues
- C. Lack of honesty
- D. Feelings of abandonment

### IV. OMIC's Experience

- A. 2012-2022 stats
- B. Cosmetic surgery issues
- C. Functional surgery issues

### V. Best Practices to Avoid Litigation

- A. Improve your processes
  - 1. Set realistic expectations
  - 2. Procedure-specific consent forms
  - 3. Postop follow-up
- B. Improve your communication
- C. Improve your doctor-patient relationship
- D. Improve your documentation

### VI. What if the patient is threatening litigation?

- A. Call your risk management team ASAP.
- B. Keep open communication with the patient.
- C. Protect the chart.
- D. Cooperate with your malpractice carrier.

### VII. Q&A Session With Expert Panel



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**Cat Burkat MD FACS**

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**Keith D Carter MD FACS**

Genentech: C

**Jorge Corona MD**

None

**Lilangi S Ediriwickrema MD**

None

**Bitu Esmali MD FACS**

None

**Robert A Goldberg MD**

None

**Andrew R Harrison MD**

Horizon Pharmaceuticals: C,L  
RVL Pharmaceuticals: C

**Morris E Hartstein MD**

None

**Michael J Hawes MD FACS**

Johnson & Johnson: US

**John Bryan Holds MD**

Cypris Medical: PS  
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Revance Therapeutics: PS

**Thomas Edward Johnson MD**

None

**William R Katowitz MD**

Horizon: L

**Michael Kazim MD**

None

**Robert C Kersten MD**

None

**Bobby S Korn MD PhD FACS**

Horizon Therapeutics: C

**Andrea N Kossler MD**

Horizon Therapeutics: C  
Immunovant Therapeutics: C

**Bradford William Lee MD MSC**

None

**Wendy W Lee MD**

Allergan: C  
Evolus: C  
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Vertical/Osmotica: C

**Nicholas R Mahoney MD**

None

**Kenneth E Morgenstern MD**

None

**Ron W Pelton MD PhD**

None

**Philip R Rizzuto MD FACS**

None

**Daniel B Rootman MD MSc**

Cellularity: C  
Horizon: C

**Erin M Shriver MD**

Horizon Therapeutics: C  
Tarsus Pharmaceutical: C

**Rona Z Silkiss MD FACS**

None

**David T Tse MD FACS**

None

**Sara T Wester MD**

Horizon Therapeutics: C  
Immunovant: C  
Vasaragen: C

**Julie A Woodward MD**

Allergan: C,L  
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**Michael T Yen MD**

None

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