

## Eyelid malignancies: treatment update

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1

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2

- When to biopsy?
  - If we don't know what it is.
  - OR
  - If it is thought to be malignant.
- "I don't know what it is, but it's benign"
  - Please never say this.

3

- My approach
  - If I believe it is benign, I tell them that.

BUT

With the caveat that I cannot tell the patient with 100% certainty that the lesion is benign without a biopsy. I always document this in the chart.

We are wrong about 2-5% of the time.

4

- The usual suspects
  - Basal cell carcinoma
  - Squamous cell carcinoma
  - Sebaceous carcinoma
  - Melanoma
  - Merkel Cell Carcinoma
  - Rare birds



- But, now there is a brave new world

5

- Targeted agents
  - The future of oncology and rheumatology treatments
  - Interfere with specific targeted molecules needed for tumor growth or inflammatory pathways
  - Provide more precision and fewer side effects



6

- Orbital, eyelid, and lacrimal disease amenable to targeted therapy
  - Oncologic conditions
  - Inflammatory conditions

7

- Traditional treatment of periocular malignancy
  - Surgical excision
    - Can be disfiguring
    - Sometimes incomplete
  - Radiotherapy
    - Can affect adjacent structures, especially the eye
  - Traditional chemotherapy
    - Can affect normal populations of cells
      - Cells with a high mitotic rate

8

### Nomenclature

- Molecularly targeted agents (MTAs)
  - Monoclonal antibodies
    - mab
  - Small molecule inhibitors
    - ib

Generic naming formula: Name = prefix + substem(s) + stem

variable	antib	monoclonal antibody	small molecule with inhibitory properties
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Monoclonal antibodies	Target	Source
-cl(r)	circulatory system	-ximab chimeric human-mouse
-li(m)	immune system	-zumab humanized mouse
-t(u)	tumor	-mumab fully human

Small molecules	-inib
-tykib	tyrosine kinase inhibitor
-zomb	proteasome inhibitor
-cdkib	cyclin-dependent kinase inhibitor
-parib	poly ADP-ribose polymerase inhibitor

9

- Monoclonal antibodies
  - cl(r): circulatory system
  - li(m): immune system
  - t(u): tumor
- ximab: chimeric human/mouse
- zumab: humanized mouse
- mumab: fully human

10

### Monoclonal antibodies

- Target specific antigens
  - Intravenous or subcutaneous therapy
  - Transmembrane receptors
  - Extracellular growth factors
  - Conjugate with radio-isotopes or toxins to allow specific delivery

11

- Small molecule inhibitors
  - tinib: tyrosine kinase inhibitor
  - zombib: proteasome inhibitor
  - cdkib: cyclin-dependent kinase inhibitor
  - parib: poly ADP-ribose polymerase inhibitor

12

- Small molecules
  - Usually oral therapy
  - Penetrate cell membrane
    - Including blood-eye and blood-brain barriers
  - Usually interfere with a metabolic or enzymatic step in the target cell

13

- Two approaches to finding effective MTAs
  1. Characterize tumor cells or cells/pathways in the immune system and develop agents that target unique molecules involved in these cellular pathways
  2. Take existing agents and screen cells to find possible candidates that would be affected by the agent

14

## Basal Cell Carcinoma

- History
  - Unprotected extensive sun exposure
  - Skin radiation for inflammatory (acne) or malignant skin conditions
  - Previous skin cancer
  - Non healing, ulcerated skin lesion

35

15

## Basal Cell Carcinoma

- Risk factors
  - UV exposure
    - Indoor tanning before age 25 years
    - Past history of severe sun burn
    - Chronic history of sun exposure (farmer, life guard, etc)
  - Previous skin cancer
  - Previous skin therapeutic radiation
  - Basal cell nevus syndrome
  - Xeroderma pigmentosum

36

16

## Basal Cell Carcinoma

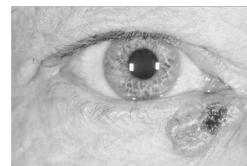
- Features
  - Nodular lesion
    - Often elevated, but may be flat
    - Central ulceration possible
    - Irregular margins
    - Often elevated pearly margins with telangiectasias
  - Non tender
  - Loss of normal skin or eyelid margin architecture (i.e., loss of lashes)
  - Occasionally pigmented or cystic

37

17

- What is new with basal cell carcinoma?

- Treatment
  - Complete Excision
  - Cryotherapy
  - Radiation therapy
  - Imiquimod
  - Small molecule inhibitors



18

- Mohs vs intraoperative frozen section
  - Nodular vs morpheaform
  - Indications for Mohs
    - BCC and SC of the "mask area of the face", cheeks, and forehead
  - Advantages and disadvantages
  - Cost/involvement of two physicians

19

- My preference for Mohs
  - Highest success rate of complete excision
  - Retains greatest amount of uninvolved tissue
  - Recurrent disease
  - Morpheaform
  - Involvement of the either canthus
  - A lot depends on your relationship with the Mohs doctor

20

- Topical 5% imiquimod
- Tretinoin
- 5-Fluorouracil
- Cryotherapy
- Radiation

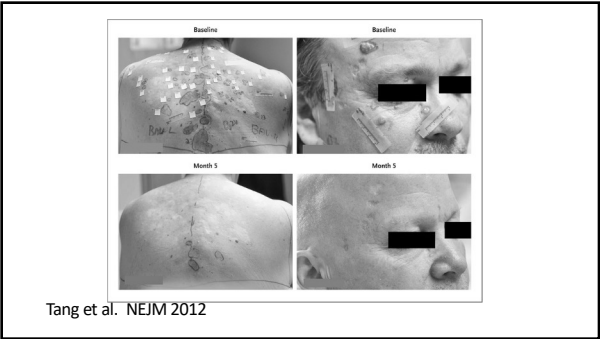
21

- Basal cell nevus syndrome
  - Multiple basal cell carcinomas
  - Jaw keratocysts
  - Skeletal abnormalities
  - Palmar pits
  - Tarsal cysts
  - Autosomal dominant
    - PTCH1 gene
  - There is a spectrum of disease

22

- Vismodegib, Sonidegib
  - Inhibitor of the hedgehog signaling pathway
  - Treatment of metastatic and locally advanced basal cell carcinoma
    - Von Hoff et al. N Engl J Med 2009
  - Median treatment of 8-11.5 months
  - Use as a neoadjuvant to shrink tumor to a resectable size
    - Sagiv et al. Br J Ophthalmol 2018
  - Basal cell nevus syndrome
  - Side effects
    - Muscle spasms, dysgeusia, fatigue, alopecia, nausea
  - Watch for SCC emergence after treatment
    - Patients with baso-squamous differentiation are not candidates

23



24



- Singalavanija et al., OPRS 2023
  - 384 patients with periocular locally advanced basal cell carcinoma treated with vismodegib
  - 75% overall response rate
  - Median treatment duration of 9 months
  - 43% required adjuvant surgery after treatment
  - 6% exenteration rate
  - 7.8% median recurrence rate at 20 months
  - 29% median discontinuation due to side effects

25

## Squamous Cell Carcinoma

- History
  - Unprotected extensive sun exposure
  - Skin radiation for inflammatory (acne) or malignant skin conditions
  - Previous skin cancer
  - Non healing, hyperkeratotic skin lesion with inflammation and/or bleeding
  - Most cutaneous squamous cell carcinomas arise from pre-existing lesions such as actinic keratosis, Bowen's disease, radiation dermatoses, burn scars, and inflammatory lesions
  - Immunosuppression
    - Transplantation
    - Leukemia (CLL)
    - AIDS

26

26

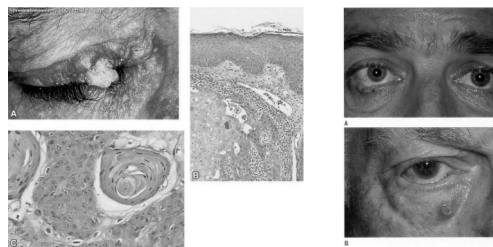
## Squamous Cell Carcinoma

- Features
  - Hyperkeratotic macular (flat) or nodular (elevated) skin lesion
  - May have significant inflammatory component
  - Later phases may have ulceration
  - Associated sun damaged skin
  - Loss of normal eyelid architecture (i.e. loss of lashes, eyelid margin distortion)
  - Perineural extension - centripetal perineural spread
    - Loss of sensation
    - Pain
  - Regional lymph node spread

27

27

## Squamous Cell Carcinoma



28

28

- What's happening with squamous cell carcinoma?
  - Precursors
    - Actinic keratosis
    - Keratoacanthoma

29


- Actinic keratosis
  - Squamous cell carcinoma in situ
  - 5-20% risk of conversion to SCC over 10-25 years
  - Due to this risk or transformation, it is recommended that AKs are treated
    - Topical 5% 5-FU
      - BID for 2-4 weeks
    - Imiquimod
      - 3 times weekly for 8 hours for 4 weeks
    - Cryotherapy
      - Apply 10-30 seconds
    - Surgical excision

30

- All treatments have risk of recurrence
  - Careful follow up


31

- 74 year old female with left brow pain for 6 months
- Diagnosed with trochleitis
- Palpable nodule a left medial canthus



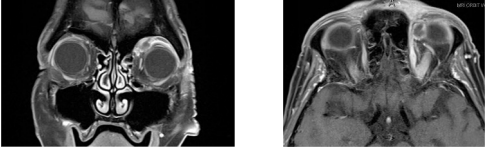
32

- Biopsy: poorly invasive squamous cell carcinoma with perineural invasion




33

- On further questioning
  - History of actinic keratosis in the same region treated topically with Imiquimod cream



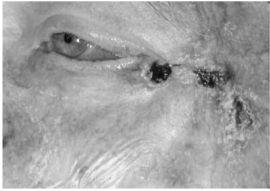
34

- Keratoacanthoma
  - In general thought to be self-limiting
    - 5% in non-eyelid cases progress to SCC
    - 16.7% of eyelid lesions proved to be invasive
  - Rapid growth
  - Rolled elevated edges with a central core of keratin
  - Biopsy which includes cells of the base
  - Surgical excision, but don't be too aggressive



35

- Squamous cell carcinoma
  - Traditional treatment
    - Complete excision
    - Radiation
    - Chemotherapy



36

- Mohs vs frozen section
  - Similar indications as per basal cell carcinoma
  - I prefer Mohs

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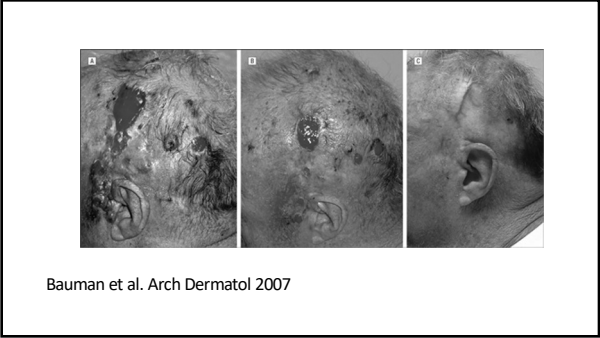
- Chemotherapy
  - Cisplatin +/- 5-FU
- Targeted therapy
  - Usually reserved for unresectable disease
  - Cetuximab
  - Gefitinib, erlotinib

38

- Anti-EGFR antibodies
  - Cetuximab (Erbix), panitumumab (Vectibix)
  - Colorectal cancer, head and neck cancer
  - EGFR overexpressed in cutaneous squamous cell carcinoma
    - Treatment success of inoperable periocular SCC with or without orbital invasion
      - El-Sawy et al. Arch Ophthalmol 2012
  - EGFR present on eyelid skin, Meibomian glands, lash follicles, conjunctiva/corneal epithelial cells
    - Corneal thinning, corneal erosions/keratitis
    - Abnormal growth of eyelashes
    - Periorbital dermatitis



39

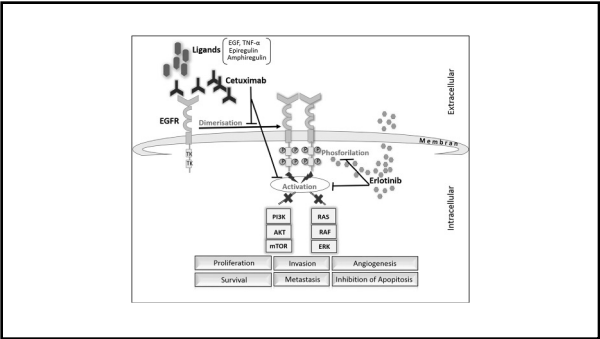


Bauman et al. Arch Dermatol 2007

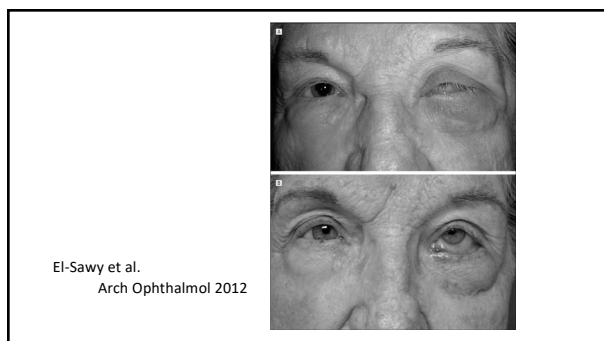
40

- EGFR small molecule inhibitors
  - Gefitinib (Iressa), erlotinib (Tarceva), afatinib
  - Success reported in treatment of advanced periocular cutaneous squamous cell carcinoma with orbital invasion
    - El-Sawy et al. Arch Ophthalmol 2012
  - Non-small cell cancer and pancreatic cancer
  - Similar side effects to anti-EGFR monoclonal antibodies
    - "Conjunctivitis"
    - More keratitis than anything else
    - Abnormal eyelash growth

41

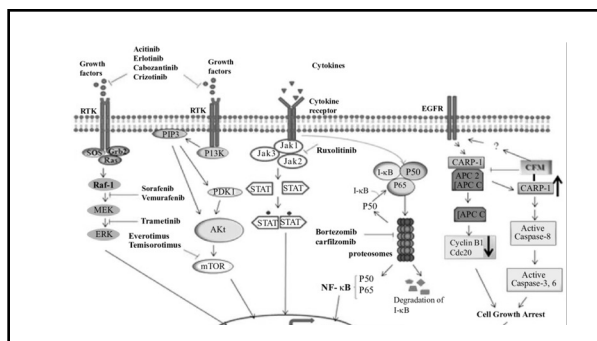


42



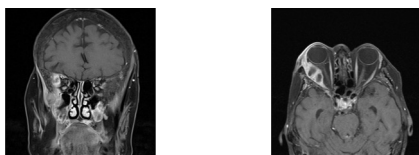
El-Sawy et al.  
Arch Ophthalmol 2012

43



44

- The issue of perineural invasion
  - Especially an issue in immunosuppressed patients
  - Evidence to support the use of post-op radiation



45

- Be extra vigilant in immunosuppressed patients
  - Solid organ transplants
  - CLL

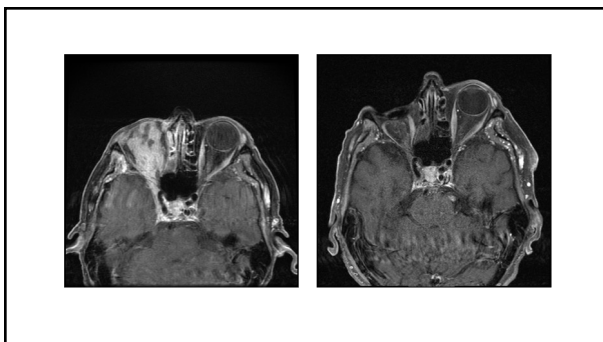
46

- PD-1 inhibitors
  - Some very promising results with cemiplimab
- Almost all patients with orbital invasion of a cutaneous squamous cell carcinoma are now started on a PD-1 inhibitor

47



48



49



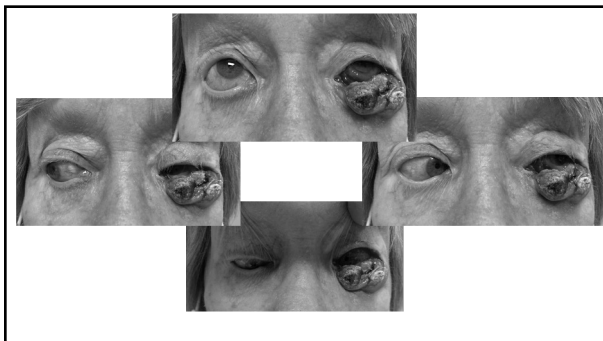
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51



52



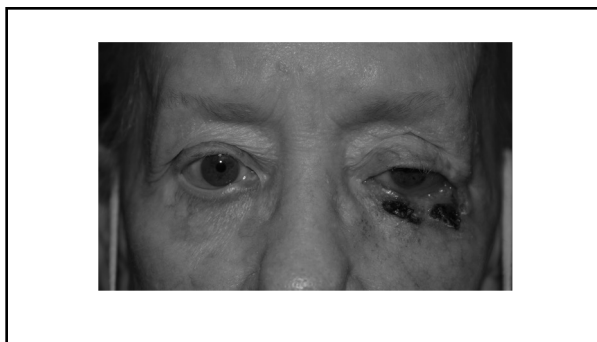
53

• During work up, found to have a lung mass  
• Primary carcinoma of the lung

54



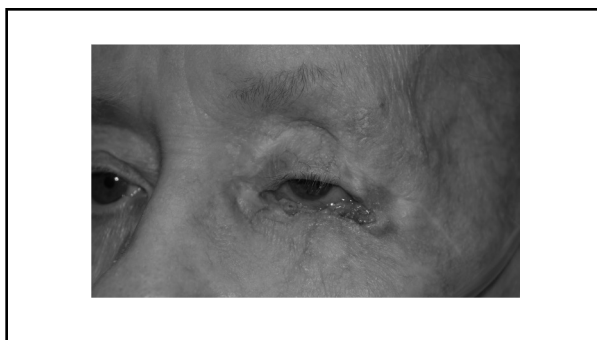
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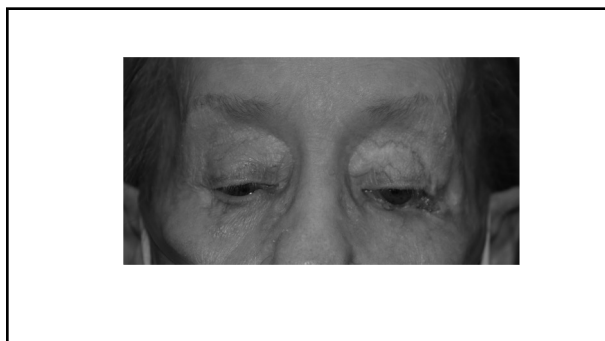
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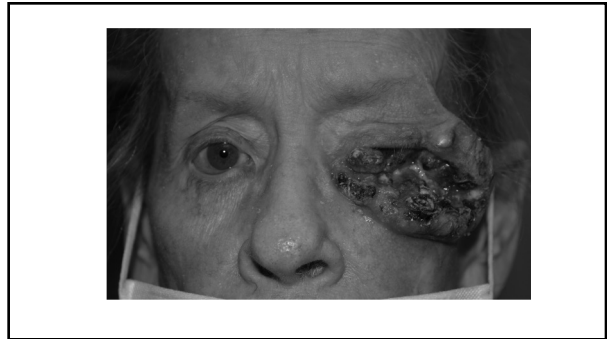
59

- Experienced adverse effects from the immunotherapy
  - Immunotherapy stopped

60



61



62



63

• Immunotherapy

64

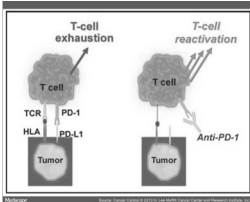
- Checkpoint inhibitors
  - Take advantage of the host's immune system to fight abnormal cells
  - Healthy immune system is needed to prevent the development of neoplasms
    - Immunosuppressed patients develop worse cutaneous, nonmelanoma skin cancers
      - Solid organ transplant
      - CLL
  - Some tumor cells overexpress immune checkpoint molecules
  - Two pathways currently targeted
    - Cytotoxic T-lymphocyte-associated antigen 4 (CTLA-4)
    - Programmed cell death 1 (PD-1, PD-L1, PD-L2)

65

- Anti-CTLA-4 antibodies (checkpoint inhibitor)
  - Ipilimumab (Yervoy), tremelimumab
  - CTLA-4 expressed on cytotoxic T cells and regulates/inhibits T-cell activation
  - Blocking CTLA-4 enhances existing T-cell responses
  - Metastatic melanoma, renal cell carcinoma, colorectal carcinoma

66

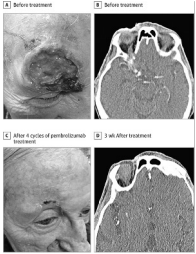
- PD-1 inhibitors (checkpoint inhibitor)
  - PD-1 inhibitors: Nivolumab (Opdivo), pembrolizumab (Keytruda), cemiplumab
  - PD-L1 inhibitors: Atezolizumab, avelumab, durvalumab
  - PD-1 limits the activity of T-cells
  - Binds PD-L1 and PD-L2
  - Anti-PD-1/PD-L1/PD-L2
    - inhibits programmed T cell death
  - Metastatic melanoma, lung cancer



67

- Evaluation of PD-1 and PD-L1 expression in eyelid and orbital disease
  - Cutaneous squamous cell carcinoma
    - Migden et al. N Engl J Med 2018
  - Conjunctival squamous cell carcinoma
    - Wolkow et al. Am J Ophthalmol 2019
    - Demirci et al. Ophthalmology 2021
  - Sebaceous carcinoma
    - Kandl et al. Oncoimmunology 2018
    - Xu et al. Acta Ophthalmologica 2019
    - Jayaraj and Sen. Indian J Ophthalmol 2019
  - Basal cell carcinoma
    - Fischer et al. Oncol Res Treat 2018
    - Mohan et al. JAAD Case Rep 2016
  - Lacrimal gland carcinoma?
  - Merkel cell carcinoma
    - Nghiem et al. N Engl J Med 2016

68



Stevenson et al., JAMA Dermatol 2017

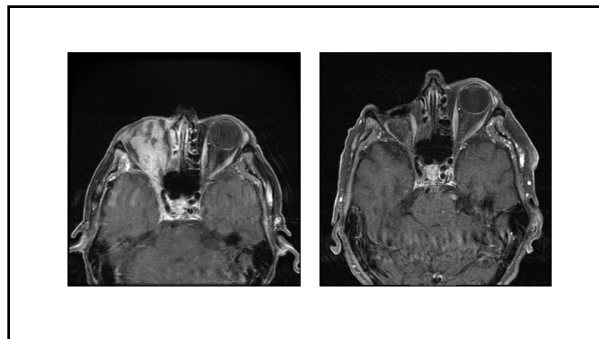
69

- Tiosano et al. Eye 2023
  - 13 patients with POLA-SCCA
  - 69.2% overall response rate
- Goldfarb et al. BJO 2022
  - 7 patients with POLA-SCCA

70

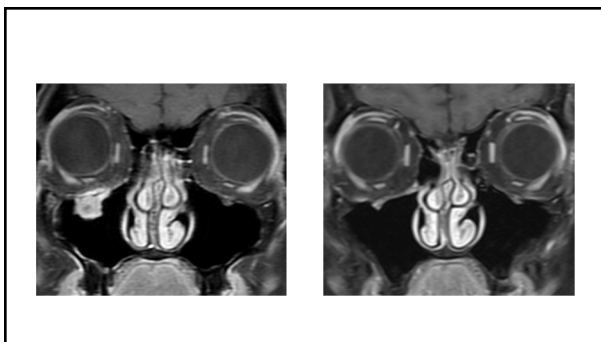


71



72





73

### Sebaceous Adenocarcinoma

- **Features**
  - Unilateral chronic blepharitis that does not respond to medical management
  - Infiltrative destruction of the normal eyelid margin architecture
  - Loss of eyelashes
  - Yellow coloration of retained lipid material
  - Multicentric origin results in noncontiguous tumor (skip lesions)
  - Intraepidermal extension results in widespread papillary elevation of tarsal conjunctiva (pagetoid spread)
  - Can mimic leukoplakia, ocular mucous membrane (cicatricial) pemphigoid, squamous cell carcinoma of the conjunctiva, and carcinoma *in situ*

74

### Sebaceous Adenocarcinoma

75

- **What's new in sebaceous carcinoma?**
  - Always remember
    - Recurrent chalazion
    - Chronic unilateral conjunctivitis

76

- Advanced age (7<sup>th</sup>-9<sup>th</sup> decades)
- Asian
- Think Muir-Torre in younger patients
  - AD
  - Predisposition to GI carcinomas

77

- **Treatment**
  - Establish diagnosis
    - Wedge resection
    - Communicate with your pathologist
  - Establish extent of disease
    - Map biopsies

78

- Sentinel lymph node evaluation
  - Tumor size greater than 10 mm ( $\geq$  T2b)
  - Controversial
- Risks factors for metastasis
  - Involvement of upper and lower lids
  - Duration of symptoms >6 months
  - Orbital invasion

79

- Treatment
  - Wide surgical excision
    - Permanent section vs Mohs vs Frozen
  - Adjuvant therapy
    - Radiation for perineural invasion
    - Topical chemotherapy
      - Mitomycin-C
      - 5-FU
    - Cryotherapy
    - Chemotherapy
      - Cisplatin/carboplatin and 5-FU

80

- When to exenterate
  - Fewer exenterations being performed
- Consider for invasive disease
- Consider for widespread disease
  - Although some would still do mitomycin and/or cryotherapy
  - Consider social situation of patient

81

- PD-1 inhibitors
  - PD-1 expressed in sebaceous cell carcinoma
  - Some anecdotal cases of response
- Awaiting results

82

## Malignant Melanoma of Eyelid

- History
  - Unprotected extensive sun exposure
  - Pre-existing acquired pigmented lesion (lentigo maligna or nevus)
  - May occur de novo
  - Historical change in pigment density, distribution, or color (surface bleeding, increase in size and thickness)
  - New nodule formation in a previous flat pigmented lesion

83

- Melanoma
  - ABCs
  - Precursor
    - Lentigo maligna (melanoma in situ)
    - Treatment
      - Imiquimod 5% daily for 7-14 weeks
      - Surgical excision
  - High risk features:
    - Breslow thickness, ulceration, mitotic figures
    - Pathology report must comment on these
- Perineural invasion, lymphovascular invasion, satellitosis, regression

84

Malignant Melanoma of Eyelid

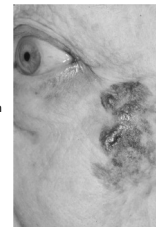


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85

85

- Treatment
  - Wide excision
    - 5mm margins when < 2mm and no high risk features
    - 10 mm when thickness is > 2mm or any melanoma with high risk features regardless of thickness
  - Permanent sections
- Evaluation by medical oncologist for high risk
  - SLN evaluation
    - Breslow thickness >2mm or ulceration



86

Lentigo maligna and Lentigo maligna melanoma (melanoma-in-situ)

- History
  - Previous actinic pre-cancerous or malignant skin lesions
  - Pigmented skin lesion in sun exposed area that has slowly increased in size or changed in color



87

87

Lentigo maligna and Lentigo maligna melanoma (melanoma-in-situ)

- Medical therapy options
  - Imiquimod as topical chemotherapeutic agent
  - Ultra-soft radiation/Grenz rays
    - In vivo reflectance confocal microscopy (RCM) can be used to assess treatment response to non-surgical therapy
    - Observation and serial photography for small macular lesions
- Surgical therapy options
  - Total surgical excision utilizing permanent sections to determine complete removal
- Close observation for recurrence and onset of new lesions

88

88

- Metastatic melanoma
  - Previously considered to be a fatal disease
  - Now cure is possible with immunotherapy

89

- Merkel cell carcinoma
  - Merkel cell is thought to be a mechanoreceptor
  - Rapidly growing, vascular appearing lesion
- Older patients
- CLL



90

- Treatment
  - Complete excision
    - 5 mm for eyelid, but 2.5-3 cm margins else where
  - Evaluation by medical oncologist
  - SLN evaluation
    - High risks of metastasis
    - Performed regardless of size



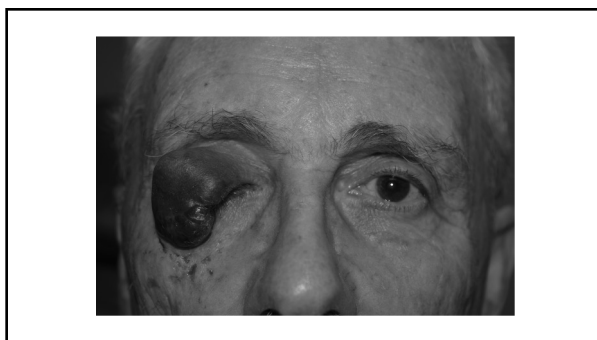
91



92

- Progression vs. pseudo-progression
  - Pseudo-progression: early inflammatory response resulting in increase in tumor size

93



94

- PD-1 inhibitors
  - Some trials ongoing for Merkel cell carcinoma
  - Mixed results

95

- What do I think is the future?
  - We will still be needed for surgical resection and reconstruction
  - Immunotherapy will likely prove to be a paradigm shift in the treatment of what was previously considered to be incurable disease
  - These medications are extremely expensive with considerable side-effect profiles
    - They will likely not replace surgery in situations in which surgery is curative and not disfiguring

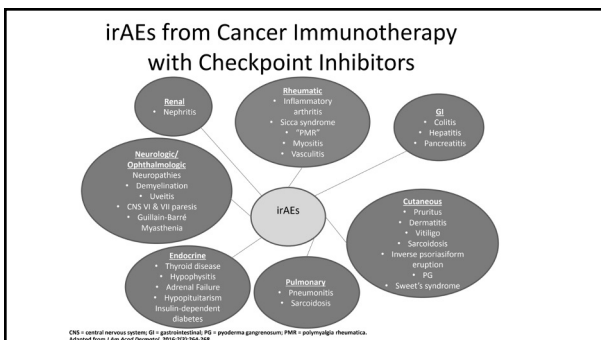
96

- Immunotherapy
  - Immune-related adverse side effects
  - Orbital inflammatory disease
  - Uveitis, scleritis
  - Induction of thyroid orbitopathy with the development of hyperthyroidism
  - Lacrimal gland inflammation
  - Enophthalmos
  - Poliosis

97



98



99

- 69 year old male
  - History of metastatic prostate adenocarcinoma
  - Notes acute, painless, ptosis on the left greater than right

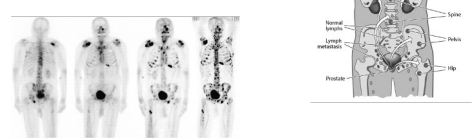


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- Developed on awakening one week prior to awakening
- Denies diplopia
- No neurological deficit
- Denies muscle pain or other weakness
- Denies swallowing issues or SOB
- No headache, scalp tenderness, jaw claudication

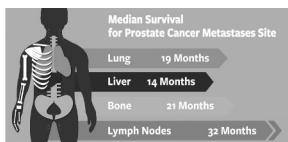
101

- Previous medical history
  - Metastatic, castration-resistant prostate cancer
    - To bones and lymph nodes
    - s/p prostatectomy in 2004
    - s/p salvage radiation therapy in 2006



102

- Current therapy
  - Ipilimumab and nivolumab
    - s/p two cycles separated by 3 weeks



103

- Exam
  - Va 20/20 OD, 20/25 OS
  - Pupils: equal, reactive; no RAPD
  - Motility: full
  - IOP: nl
  - SLE: moderate cataract
- Lid measurements
  - MRD1: 0 mm OD, -4 mm OS
  - PF: 5 mm OD, 1 mm OS
  - LF: 10 mm OD, 2 mm OS

104

- Concerns:
  - Myasthenia
  - Myositis
  - Metastasis

105

- Ice test: no significant change
- Imaging:
  - MRI of brain and orbits with and without contrast normal
- Labs:
  - BMP, CBC, LFTs, CK levels, ESR, CRP, Cortisol, T4, TSH, ANA, AchR abs, anti-Musk abs, paraneoplastic panel, myositis ab panel, aldolase, voltage gated Ca channel abs labs sent

106

- Patient admitted to hospital
- Started on solumedrol IV

107


- Immunotherapy-related adverse event (irIA)
  - Neuromuscular junction
  - Myositis/myopathy

108

- 5 days after hospital discharge, ~3.5 weeks since onset of left sided ptosis
- Impression: immunotherapy induced myasthenic syndrome and myositis
- No appreciable change in ptosis and exam
- Plan:
  - continue slow steroid taper
  - follow ups with rheum/neuroonc
  - f/u with ophthalmology in 1 month


109

- 8 weeks later

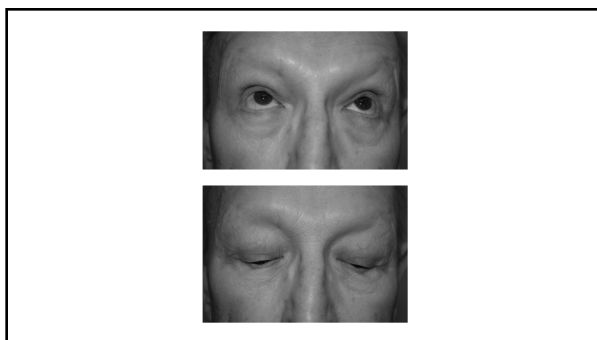


110

- 8 months after presentation




111



112

- It's not all rainbows and unicorns with immunotherapy.
  - Side effects
  - Worsening autoimmune disease
  - Inability to use in patients with solid organ transplants



113

- Take advantage of these newer therapies in the care of your patients
  - These agents are not going away anytime soon
  - Involve your medical oncologist and rheumatologist
- They are expensive!
  - May prevent wide-spread use
- Ask you patients about their cancer history
  - Side effects
  - Google their medications

114



## Financial Disclosures

- Consultant:
  - Allergan
  - Galderma
  - Revance
  - Evolus
  - RVL
  - Horizon
  - Tarsus
  - Viridian
  - RoC
  - Novabay

## OCULAR TRAUMA

- THE EYE IS RELATIVELY SMALL
  - 0.1% OF THE FRONTAL SURFACE AREA
- 2.5 MILLION EYE INJURIES PER YEAR

## OCULAR TRAUMA STATISTICS

- OCULAR TRAUMA IS THE #1 CAUSE OF VISION LOSS IN PATIENTS 25 AND UNDER
- 1 MILLION ARE PERMANENTLY VISUALLY IMPAIRED
- LIFETIME PREVALENCE OF EYE INJURY IS 20%
- A PERSON WITH AN EYE INJURY IS 3X MORE LIKELY TO HAVE A 2<sup>ND</sup> EYE INJURY

## OCULAR TRAUMA

- THE MOST COMMON INJURIES OCCUR IN THE HOME
  - DO IT YOURSELF PROJECTS AND GARDENING
- A GROWING PHENOMENON IS SATURDAY NIGHT TRAUMA
  - INTOXICATION AND RIOTS
- YOUNG AGE AND MALE GENDER ARE MAJOR RISK FACTORS

## OCULAR TRAUMA CAUSES

- FIREWORKS
- SELF INFLICTED
  - FIREARMS RESPONSIBLE FOR 71%
- 4.7% FROM BB OR PELLET GUNS
- 0.8% FROM PAINTBALLS
- NATURAL DISASTERS
  - COMPLEX EYELID AND ORBITAL TRAUMA
- TERRORIST ATTACKS
  - CORNEAL & CONJUNCTIVAL INJURIES



## OCULAR TRAUMA FROM MOTOR VEHICLE ACCIDENTS

- 9% OF OCULAR INJURIES ARE CAUSED BY MVAS
- LEADING CAUSE OF BILATERAL INJURIES
- AIR BAG, STEERING WHEEL, WINDSHIELD
- SEAT BELTS HELP!
  - 96% OF SEAT BELT WEARERS WILL ACHIEVE VA OF 20/40 OR BETTER
  - 76% OF NON-WEARERS WILL ACHIEVE THIS VA

## OCULAR TRAUMA IN THE WORKPLACE

- 16% OF OCULAR TRAUMAS
  - MOST IN CONSTRUCTION INDUSTRY
- 2,000 WORK RELATED EYE INJURIES/DAY
- NAILS AND METAL SHAVINGS
- DELAY OF TREATMENT


## OCULAR TRAUMA FROM SPORTS

- 15% OF EYE INJURIES
- MOST COMMON FORM OF EYE INJURY IN CHILDREN AGE 5 - 14
- 22.6% OF SPORTS RELATED EYE INJURIES OCCUR DURING BASEBALL
  - 16.1% FISHING
  - 10.6% SOFTBALL
  - 16% BASKETBALL
- IN 1980 THE HOCKEY FACE PROTECTOR SAVED SOCIETY \$10 MILLION A YEAR BY PREVENTING 70,000 EYE AND FACE INJURIES IN 1.2 MILLION PROTECTED PLAYERS

## Trauma in New Orleans

- City at risk for named weather storms
  - Increasing gun violence in landfall and aftermath
- Post-Katrina
  - Increased penetrating injuries
  - Increased number of procedures/patient
- Shootings up 233% in 2022

## Trauma During Mardi Gras

- Approximately 1.4 million visitors
  - Alcohol and drug intake increased
    - Poor decision making
      - altercations
    - Increased MVAs
  - Parade foreign bodies
- 
- 
- 
- Ocular pain, blur, FBS, tearing, photophobia
  - Subconjunctival hemorrhage, corneal abrasion, cell and flare, lid laceration

## OCULAR TRAUMA

- WHO SEES THE TRAUMA FIRST OFTEN TREATS THE TRAUMA FIRST
  - EMERGENCY ROOM
  - OPTOMETRIST
  - OPHTHALMOLOGIST
- MAY LEAD TO VERY DIFFERENT TREATMENT SCENARIOS
- TEAM APPROACH IS KEY

## PERIOCCULAR TRAUMA

- 5% OF ALL SERIOUS INJURIES
  - 81% INVOLVE THE CANALICULUS
  - MAJORITY IN CHILDREN
    - 23% 0-9 YEARS OLD

## ASSESSMENT

- ENSURE THAT ALL LIFE-THREATENING ISSUES ARE ADDRESSED FIRST
  - AIRWAY
  - BREATHING
  - CIRCULATION
  - CERVICAL SPINE
- VITAL SIGNS
- GENERAL EXAMINATION

## ASSESSMENT

- THOROUGH HISTORY
  - REVIEW NOTES OF OTHER TRAUMA PHYSICIANS
  - IF PATIENT CAN NOT RELIABLY GIVE INFORMATION, SEEK HISTORY FROM FAMILY, FRIENDS OR WITNESSES
  - LAST ORAL INTAKE, ALLERGIES, MEDICATIONS
  - MECHANISM OF INJURY

## MECHANISM OF INJURY

- MOTOR VEHICLE ACCIDENT
  - WINDSHIELD SHATTERED
  - AIRBAG INFLATION
  - EJECTION FROM VEHICLE
- BITE WOUNDS
  - HUMAN
  - DOG
- PENETRATING INJURY
  - MAY INDICATE UNDERLYING GLOBE INJURY

## HISTORY

- TIMING
  - TO ENSURE THAT ADEQUATE TIME HAS PASSED BEFORE REPAIR FOR EDEMA TO IMPROVE
- LOCATION
- TETANUS IMMUNIZATION HISTORY
  - IN THOSE WITHOUT PREVIOUS IMMUNIZATIONS
    - 250 UNITS OF HUMAN TETANUS IMMUNE GLOBULIN IM
  - > 10 YEARS SINCE LAST TETANUS BOOSTER
    - 0.5ML TETANUS TOXOID IM OR SQ

## OCULAR EXAMINATION

- COMPLETE OCULAR EXAMINATION
  - MUST LIFT LID TO EXAMINE GLOBE
  - VISUAL ACUITY
  - CAREFUL MANIPULATION IN CASE OF GLOBE RUPTURE
  - RULE OUT GLOBE RUPTURE
  - IOP IF NO INDICATION OF GLOBE RUPTURE

## EXAMINATION

- CORNEAL INJURY
- LOOK FOR FOREIGN BODIES
- AFFERENT PUPILLARY DEFECT
- EXTRAOCULAR MOTILITY
- SLIT LAMP EXAM
- FUNDOSCOPIC EXAM

## EYELID TRAUMA

### TRAUMA TO THE EYELIDS

- CONTUSION
  - SUPERFICIAL ECCHYMOOSIS AND SOFT TISSUE SWELLING



### TRAUMA TO THE EYELIDS

- ABRASION
  - SCRAPING OF THE EPITHELIUM



### TRAUMA TO THE EYELIDS

- AVULSION
  - TEARING OF THE TISSUE



### TRAUMA TO THE EYELIDS

- PUNCTURE
  - PASSAGE OF A SHARP OBJECT THROUGH TISSUE



## TRAUMA TO THE EYELIDS

- LACERATION
  - CUT TISSUE



## EXAMINATION OF THE EYELIDS

- DAMAGE TO LEVATOR APONEUROSIS
  - PRESENCE OF FAT IN WOUND
  - PTOSIS
- CANALICULAR SYSTEM
  - LACERATIONS MEDIAL TO THE PUNCTUM
  - INSPECT WITH BOWMAN PROBE
- CANTHAL LIGAMENTS
  - ROUNDING OF CANTHAL ANGLES
  - SUSPECT MEDIAL CANTHAL DAMAGE IF LACRIMAL DAMAGE
- CREPITUS
  - MAY INDICATE ORBITAL FRACTURE
- HYPESTHESIA



IT IS UNCOMMON TO HAVE  
TISSUE LOSS. MOST  
LACERATIONS PIECE  
TOGETHER LIKE A PUZZLE.



COMPLEX FACIAL LACERATION

ONE WEEK AFTER REPAIR



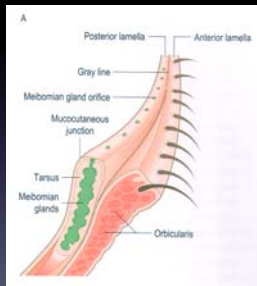
## EYELID LACERATION REPAIR

- DELAY REPAIR IF EDEMA SIGNIFICANT
  - DISTORTION OF ANATOMY
  - UNDUE PRESSURE AGAINST NEWLY APPROXIMATED WOUND
  - ICE PACKS
  - ANTIBIOTIC OINTMENT
- DELAY IF RUPTURED GLOBE

## GOALS OF EYELID REPAIR

- REALIGN EYELID STRUCTURES
- RESTORE STRUCTURAL INTEGRITY OF LID
- RESTORE FUNCTION OF EYELID
- MINIMIZE SKIN AND DEEP TISSUE SCARRING
- PROTECT THE EYE

## GOALS OF EYELID REPAIR



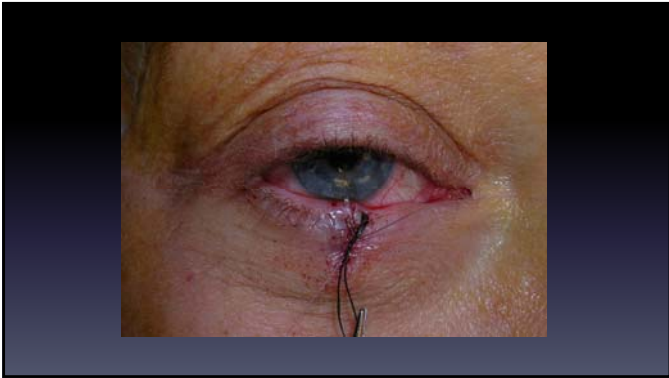
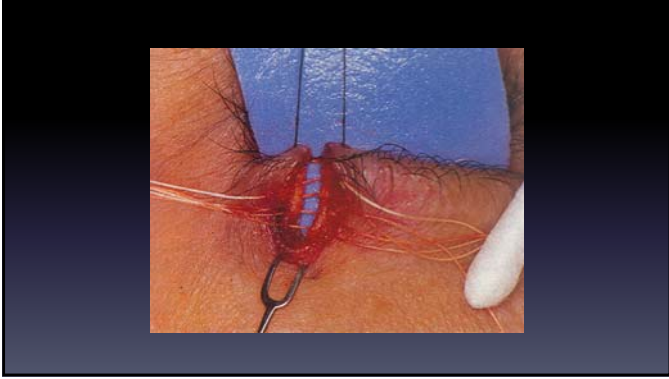
## NON-MARGINAL LID LACERATIONS

- SUBCUTANEOUS LAYERS
  - 5-0 POLYGLACTIN (VICRYL) SUTURE
  - TAKES TENSION OFF OF WOUND
  - NO NEED FOR DEEPS IN ORBICULARIS OR SEPTUM
- SKIN CLOSURE
  - 7-0 NYLON BELOW THE BROW
  - 6-0 NYLON ABOVE THE BROW
- REMOVE SKIN SUTURES IN 1 WEEK

## MARGINAL LID LACERATIONS

- SEPARATE ANTERIOR LAMELLA FROM POSTERIOR LAMELLA
- EXPOSE TARSAL PLATE ON EACH SIDE OF WOUND





LACRIMAL SYSTEM TRAUMA

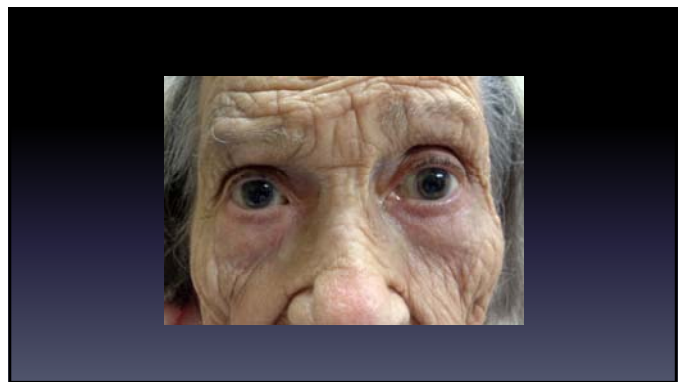


## STENTS

Bicanalicular Donut Stent

BICANALICULAR CRAWFORD STENT

MONOCANALICULAR STENT



# ORBITAL TRAUMA

- ## ORBITAL TRAUMA
- CONTUSION
    - FORCE TO THE ORBIT WITHOUT ENTERING
    - MVA
    - ALTERCATIONS
    - SPORTS
    - FALLS
  - PENETRATING
    - OBJECTS THAT PASS THROUGH THE ORBIT
    - MAY HAVE RETAINED ORBITAL FOREIGN BODY
  - HIGH VELOCITY OBJECTS CAUSE MORE DAMAGE

## HISTORY

- TRAUMA PATIENTS WITH NEUROLOGIC DEFICITS:
  - IMPAIRED VISION TESTING
  - PUPILLARY EXAM PARAMOUNT
    - RAPD MAY INDICATE COMPROMISED OPTIC NERVE
- DIPLOPIA → POSSIBLE FRACTURE

## ORBITAL EXAMINATION

- INTRAOCULAR PRESSURE
  - TYPICALLY ELEVATED IN ORBITAL TRAUMA
    - ORBITAL EDEMA
    - ORBITAL HEMATOMA
    - ORBITAL EMPHYSEMA
- INSPECT SKIN FOR ENTRY WOUNDS

## ORBITAL EXAMINATION

- DEGREE OF PTOSIS
  - EDEMA
  - HEMORRHAGE
  - NERVE DAMAGE
  - INTRAORBITAL FOREIGN BODY
- EXOPHTHALMOS
  - EDEMA, HEMORRHAGE, AIR OR FOREIGN BODIES
- ENOPHTHALMOS
  - ORBITAL FRACTURE

## NASAL EXAMINATION

- EPISTAXIS
  - → ORBITAL FRACTURE
- CLEAR LIQUID DISCHARGE
  - → CEREBROSPINAL FLUID
    - FRACTURE OF ANTERIOR CRANIAL FOSSA
    - NEUROSURGICAL CONSULT

## IMAGING?

- *IF A FOREIGN BODY OR FRACTURE IS SUSPECTED, MAY NEED IMAGING STUDIES*

## ORBITAL IMAGING

- COMPUTED TOMOGRAPHY (CT)
  - STUDY OF CHOICE FOR ORBITAL TRAUMA
  - GOOD FOR BONE
  - GOOD VISUALIZATION OF FOREIGN BODIES
    - METAL
    - GLASS
    - CERAMIC
    - STONE
    - PORCELAIN



## ORBITAL IMAGING

- MRI
  - ENSURE NO RISK OF METALLIC FOREIGN BODY
  - GOOD VISUALIZATION OF SOFT TISSUES
  - GOOD FOR WOOD AND PLASTIC
  - POOR FOR BONE AND METAL
- B-SCAN ULTRASOUND
  - MINIMAL GLOBE PRESSURE
  - DEFER IF RUPTURE

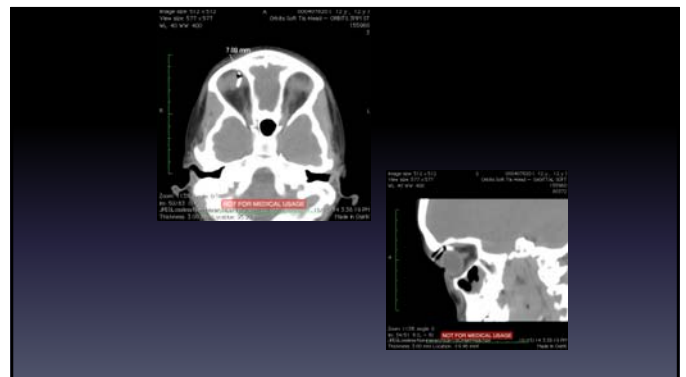
2 YEAR OLD BOY WAS NOTED BY TEACHER TO HAVE SUDDEN PTOSIS

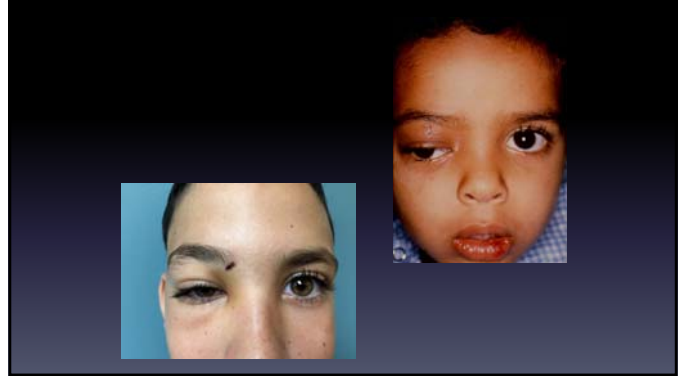
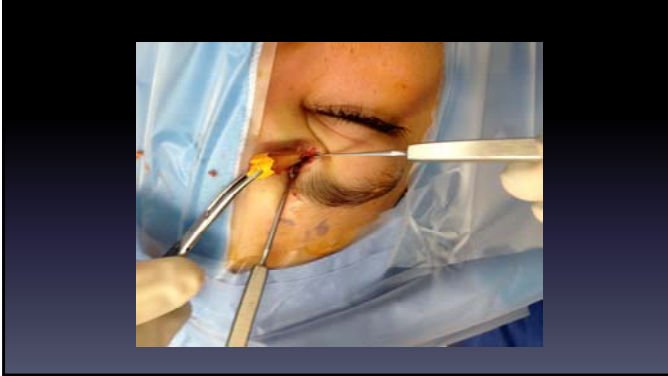


CLOSER EXAM REVEALED LIMITED UP-GAZE AND SMALL LACERATION ON UPPER EYELID



PATIENT WAS FOUND TO HAVE A PENETRATING PUNCTURE LACERATION WITH A SHARP PENCIL





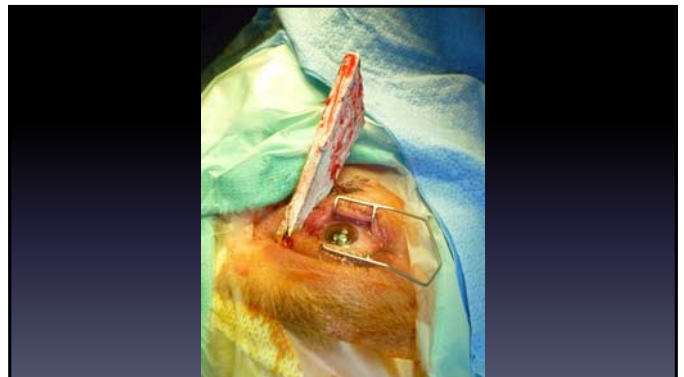
SMALL ENTRY WOUNDS  
CAN HARBOR DEEP  
INTRAORBITAL FOREIGN  
BODIES THAT ARE NOT  
VISIBLE ON EXAMINATION.

#### COMPOSITION OF ORBITAL FOREIGN BODIES

- INERT
  - LEAD
  - STEEL
  - ALUMINUM
  - GLASS
  - STONE
- LITTLE ORBITAL DAMAGE

#### COMPOSITION OF ORBITAL FOREIGN BODIES

- COPPER
  - CHRONIC INFLAMMATION
  - PURULENCE
- ORGANIC MATTER
  - POORLY TOLERATED
  - MARKED INFLAMMATION & INFECTION





### ORBITAL FOREIGN BODIES INDICATIONS FOR REMOVAL

- ACCESSIBLE ANTERIOR LOCATION
- ORGANIC MATTER OR COPPER
- INFLAMMATORY REACTION
- SHARP EDGES THAT THREATEN CRITICAL STRUCTURES
- IMPINGEMENT ON EOMS OR NERVES

### ORBITAL FOREIGN BODIES INDICATIONS FOR OBSERVATION

- SMALL, SMOOTH, INERT
- POSTERIOR LOCATION
- ABSENCE OF INFLAMMATION OR INFECTION
- LACK OF CURRENT OR POTENTIAL VISUAL COMPROMISE
- HIGH RISK FOR REMOVAL

## ORBITAL FOREIGN BODIES OBSERVATION

- MONITOR CLOSELY FOR 1<sup>ST</sup> YEAR FOR STABILITY
- WARN OF RISK OF DISLODGE MENT WITH MRI IF METALLIC



## ORBITAL FOREIGN BODIES WITH INTRACRANIAL EXTENSION

- EARLY DETECTION IS ESSENTIAL
- MORTALITY RATE IS AS HIGH AS 12%
- NEUROSURGICAL CONSULT
- CAREFUL REMOVAL
  - MONITOR FOR CSF LEAKS, BLEEDS, INFECTION

## ORBITAL TRAUMA FRACTURES

## OCULAR EXAMINATION ORBITAL FRACTURE

- FLOOR
  - ENOPHTHALMOS

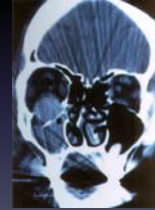
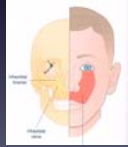


## OCULAR EXAMINATION

### ORBITAL FRACTURE

#### – FLOOR

- HYPESTHESIA OF CHEEK OR UPPER LIP



## OCULAR EXAMINATION

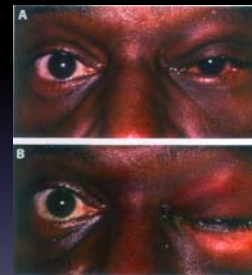
### ORBITAL FRACTURE

#### – MEDIAL WALL

- ENOPHTHALMOS
- EOM RESTRICTION

#### – CREPITUS

- AIR BENEATH SKIN
- COMMUNICATION BETWEEN SINUSES AND ORBIT



## ORBITAL FRACTURES

- 10-30% ARE ASSOCIATED WITH OTHER OCULAR INJURIES
  - CORNEAL ABRASIONS
  - TRAUMATIC HYPHEMA
  - IRITIS
  - RUPTURED GLOBE
  - COMMOTIO RETINAE
  - RETINAL DETACHMENT
  - RETINAL HEMORRHAGE

## ORBITAL FRACTURES

#### • CT SCAN

- AXIAL AND CORONAL CUTS



## ORBITAL FRACTURES TREATMENT

- ORAL ANTIBIOTICS
- NASAL DECONGESTANTS
- ICE PACKS
- INDICATIONS FOR SURGERY
  - ENOPHTHALMOS > 2MM
  - DIPLOPIA FROM ENTRAPMENT OF EOM
  - LARGE FRACTURE

## ORBITAL FRACTURES TREATMENT

- TIMING OF SURGERY
  - WAIT 7-10 DAYS TO ALLOW EDEMA AND HEMORRHAGE TO RESOLVE
  - TRAPDOOR FRACTURES OR WHITE-EYED FRACTURES
    - → URGENT

## ORBITAL FRACTURES TREATMENT

- TRAPDOOR FRACTURES
  - CHILDREN
  - OCULOCARDIAC REFLEX
    - NAUSEA
    - VOMITING
    - BRADYCARDIA
    - HEART BLOCK → EKG
  - CT MAY SHOW 'ABSENT' INFERIOR RECTUS
  - SURGERY WITHIN 24 – 72 HOURS

## ORBITAL HEMORRHAGE



## ORBITAL HEMORRHAGE

- TRAUMA
- IATROGENIC
  - PERIBULBAR OR RETROBULBAR INJECTION
  - INTRA-OPERATIVE TRAUMA OR POST-OPERATIVE BLEEDING
- SPONTANEOUS CAUSES
  - TUMORS
  - VASCULAR LESIONS
  - SYSTEMIC DISEASES

## ORBITAL HEMORRHAGE

- COMPARTMENT SYNDROME
  - CLOSED SPACE BOUND BY BONY WALLS
  - RAPID ELEVATION IN PRESSURE
    - ISCHEMIA OF TISSUES
    - INCREASED IOP
  - LESS LIKELY IN PATIENTS WITH ORBITAL FRACTURES

## ORBITAL HEMORRHAGE

### SIGNS/SYMPTOMS

- OCCURS WITHIN 12 TO 24 HOURS
- SEVERE ORBITAL PAIN
- PROPTOSIS
- ECCHYMOSIS
- VOMITING
- LIMITED OCULAR MOTILITY
- SUBCONJUNCTIVAL HEMORRHAGE
- CHEMOSIS
- INCREASED IOP

## ORBITAL HEMORRHAGE

### TREATMENT

- SEEK IMMEDIATE ATTENTION IF DECREASE IN VISION, PAIN OR BLEEDING
- OPEN WOUND
- IOP LOWERING DRUGS
- HIGH DOSE STEROIDS
- LATERAL CANTHOTOMY/INFERIOR CANTHOLYSIS



## PREVENTION OF OCULAR TRAUMA

## PREVENTION OF OCULAR INJURY

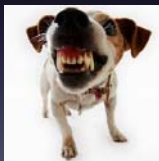
- PROPER EYE PROTECTION
  - 90% OF ALL EYE INJURIES CAN BE PREVENTED BY USING PROTECTIVE EYEWEAR
  - 75 – 80% OF THE TIME PATIENT WAS NOT WEARING EYE PROTECTION OR GOGGLES
  - MUST FIT PROPERLY AND BE EFFECTIVELY DESIGNED
- GREATER DILIGENCE, TRAINING AND PRECAUTIONS
- PREPAREDNESS OF THE TREATING PHYSICIAN

## PREVENTION OF OCULAR INJURY

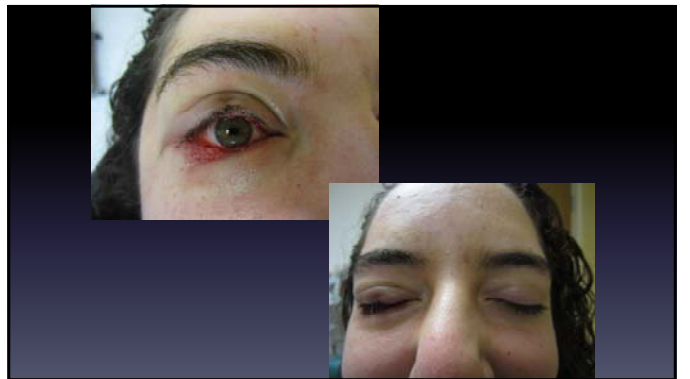
- OCTOBER IS EYE INJURY PREVENTION MONTH
  - FOCUSED PLACED ON PROTECTING EYES

## BITES

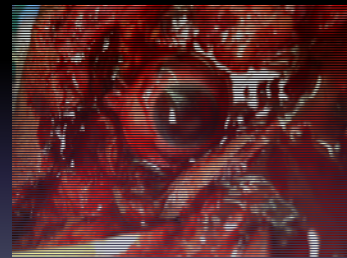
## DOG BITE INJURIES

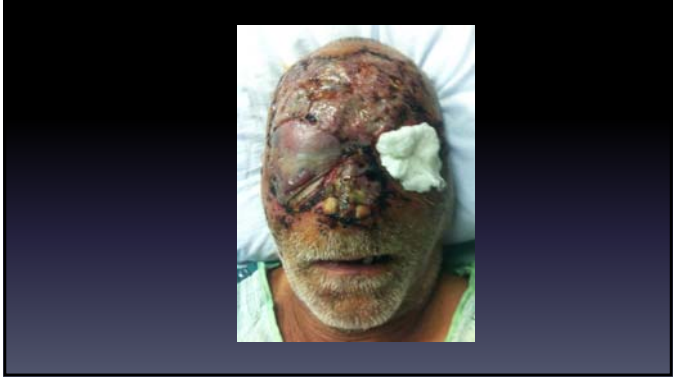
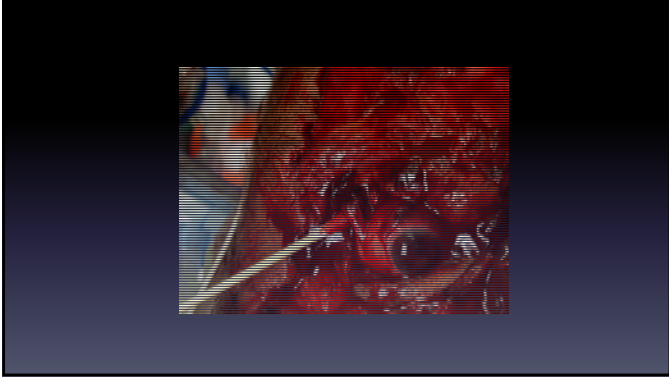




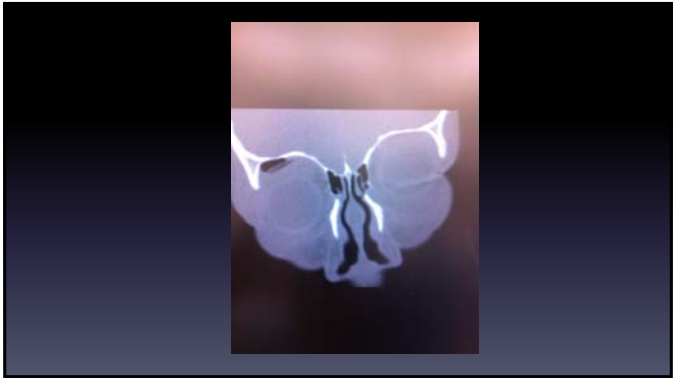
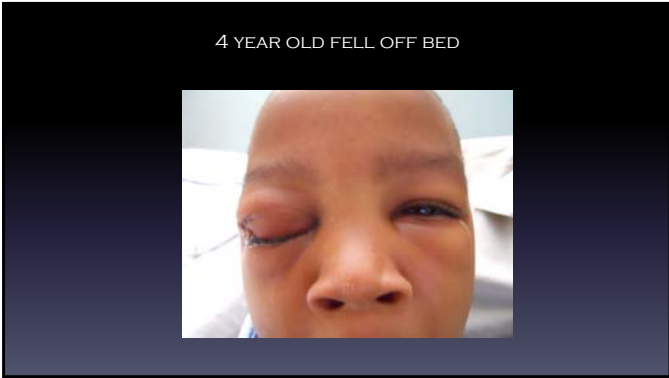


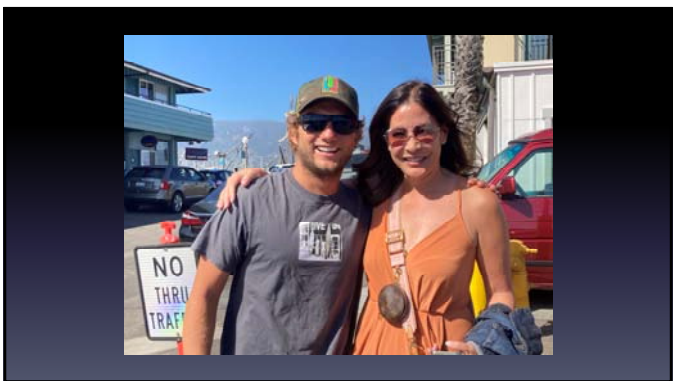
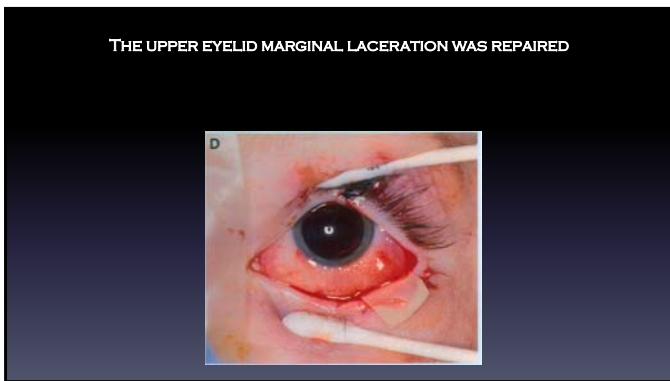
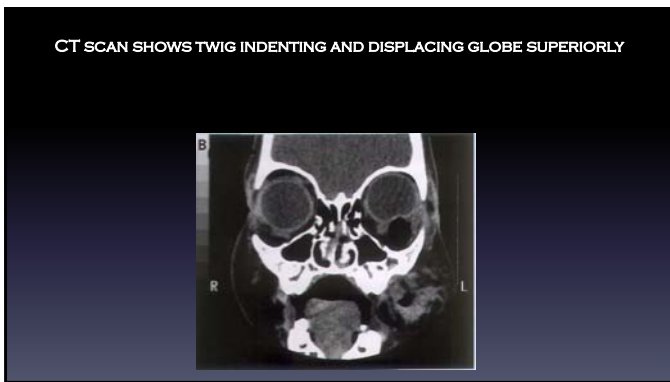
# HUMAN BITE INJURIES

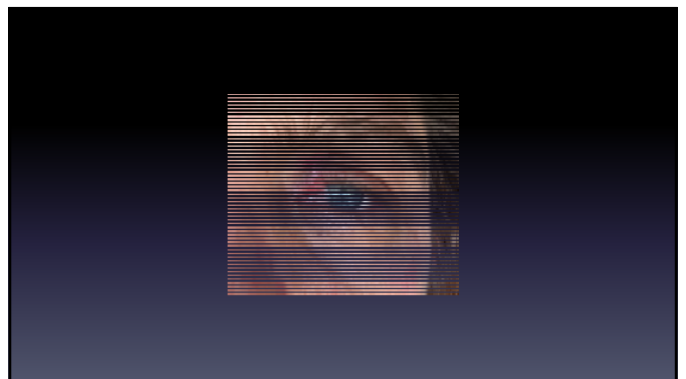
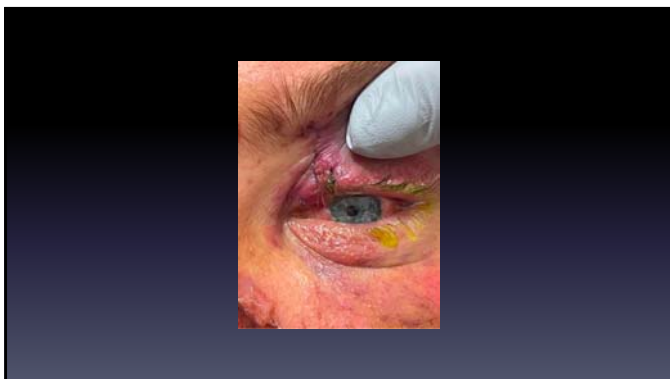
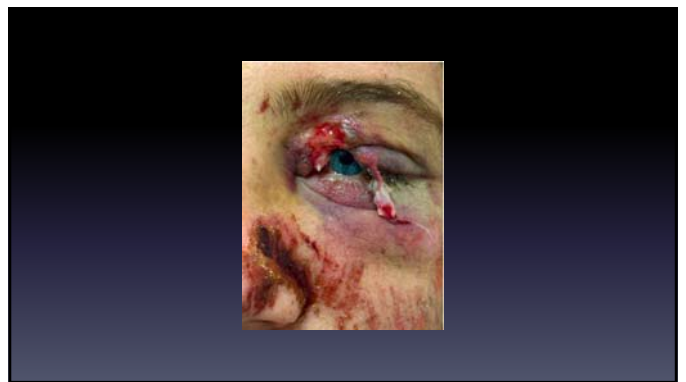
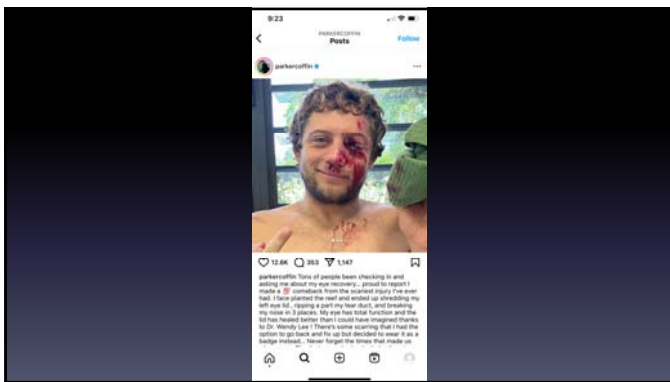
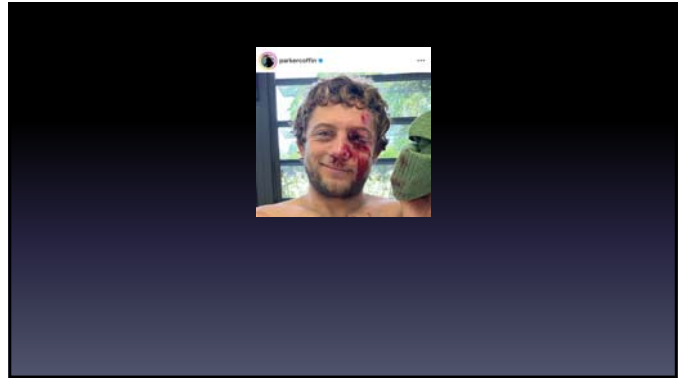




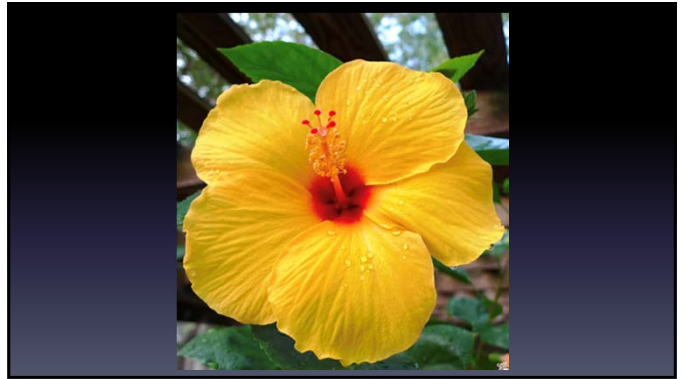
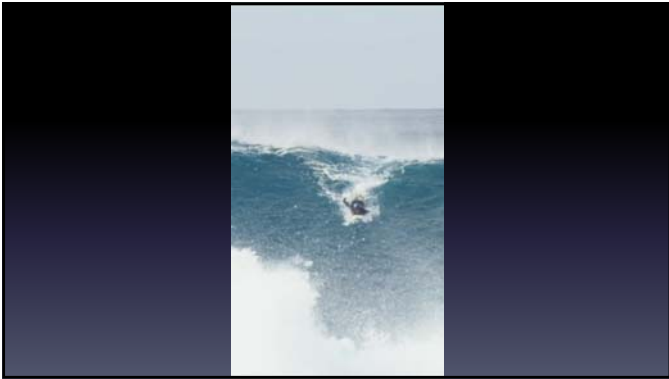
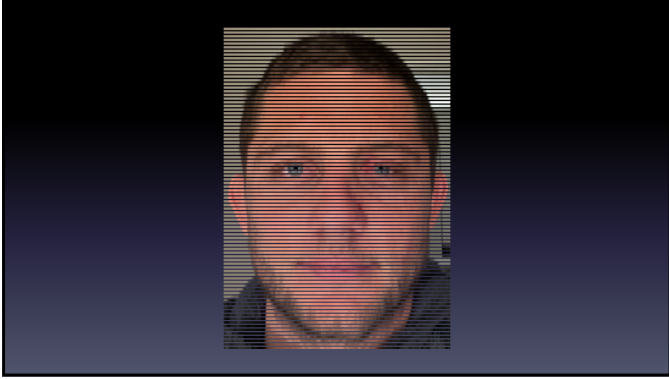
PEDIATRIC TRAUMA











## Eyelid reconstruction: What am I doing differently?

**Richard C. Allen MD PhD FACS**  
 Texas Oculoplastics Consultants  
 Professor, Department of Ophthalmology  
 Dell Medical School, The University of Texas at Austin  
 Austin, TX USA  
 Editor-in-Chief, *Orbit*  
 President-elect, IJCAHPO  
 Immediate-past-president, ASOPRS

1

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 No financial disclosures

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2

- Try to get away from the thought process that 50% or more defects should be repaired with lid sharing procedures
  - Depending on the patient, there can be significant laxity to the lower lid, allowing primary closure

3

- Advantages of lid sharing procedures
  - Provides a vascularized posterior lamella
  - Provides traction to prevent lid retraction



4

- Disadvantages
  - Second stage required
  - Eye is closed
    - Varying lengths
  - Lid margin issues
    - Erythematous lower lid margin
    - Unstable upper lid margin



5

- Principle #1

**Separate the anterior and posterior lamella**

6

- Principle #2

**Repair the lacrimal system, if needed**

7

- Principle #3

**Repair the posterior lamella**

8

- Principle #4

**Shift all defects laterally**

9

- Principle #5

**Lateral fixation of the posterior lamella for the lower eyelid**  
(I avoid Tenzel flaps)

10

- Principle #6

**Repair the anterior lamella with lateral fixation**  
(Rotational flap if needed)  
(Tripier flap if needed)

11

- Principle #7

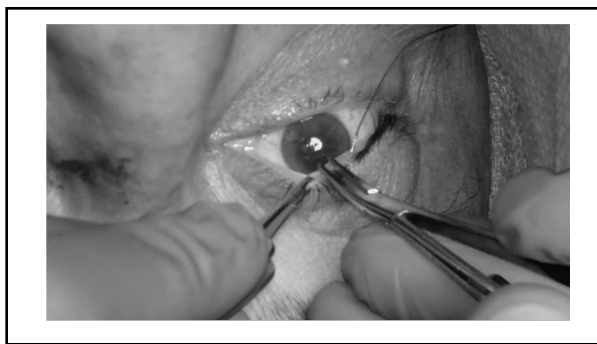
**Composite grafts as a last resort**

12



- I use a lot of free tarsal grafts
  - Try to use the contralateral upper eyelid
    - Might need ipsilateral for a Hughes flap later
    - Ipsilateral Meibomian glands are already compromised
- I do a lot of periosteal strips
  - Extra lateral stabilization
  - Exposes periosteum for anterior lamella fixation

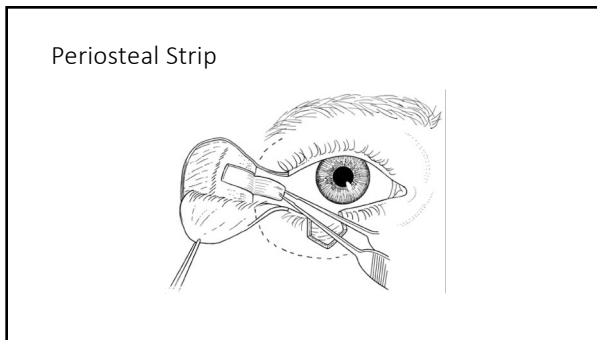
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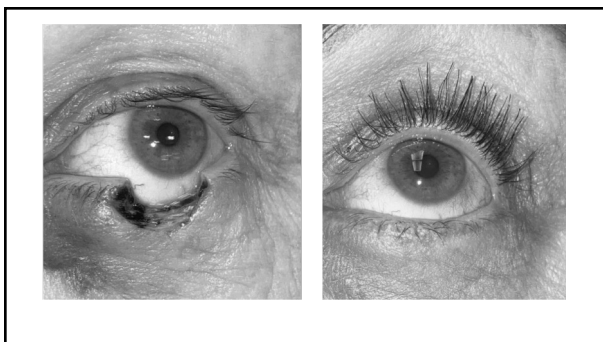
16

- Question #1  
Can I separate the anterior and posterior lamella and close the posterior lamellar defect primarily, with recruitment of anterior lamella?
- This is one of my favorite procedures even for smaller defects.
- The resulting external incision is subciliary, without a vertical scar.

17



18



19

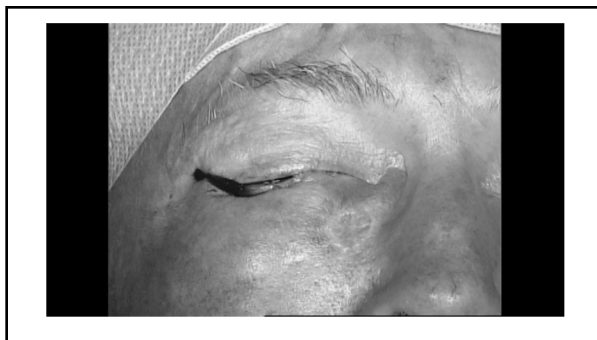
• Question #2  
Can I separate the anterior and posterior lamella, repair the posterior lamella with a periosteal strip and/or free tarsal graft, and recruit anterior lamella to repair the anterior lamella without a graft?

- This procedure relies upon the shifting of the posterior lamellar defect laterally, if it is not already lateral
- Lateral fixation with a periosteal strip will ensure lower eyelid stability

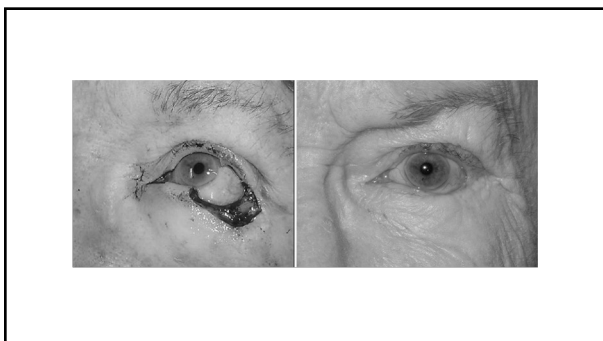
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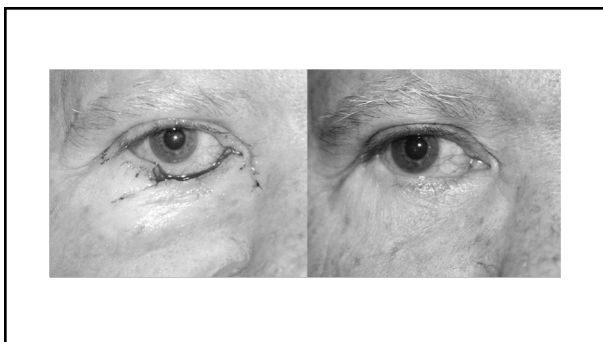
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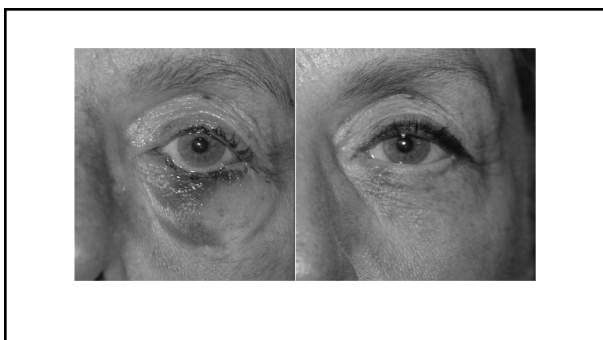
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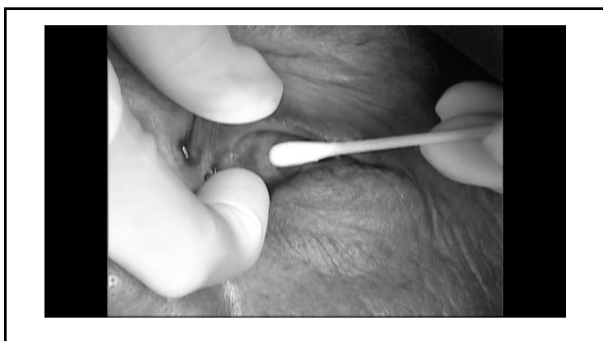


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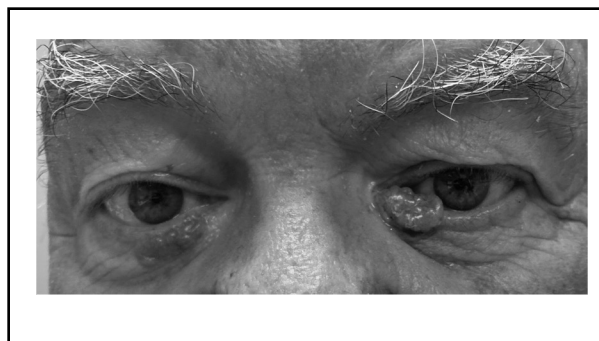
• Question #3  
Can I slide a composite flap medially and repair the resulting full thickness defect with a free tarsal graft and recruitment of anterior lamella?

- This relies upon shifting the anterior and posterior lamellar defect laterally
- As mentioned earlier, shifting the posterior lamellar defect laterally allows lateral fixation and a stable lower lid
- I have more and cosmetically favorable flap options laterally than I do medially
  - Lateral cheek elevation
  - Rotational flap
  - Tripiier flap

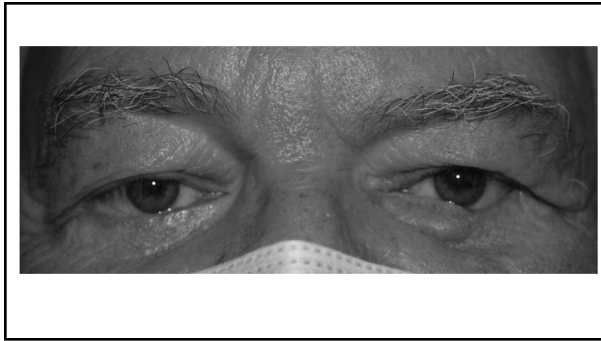
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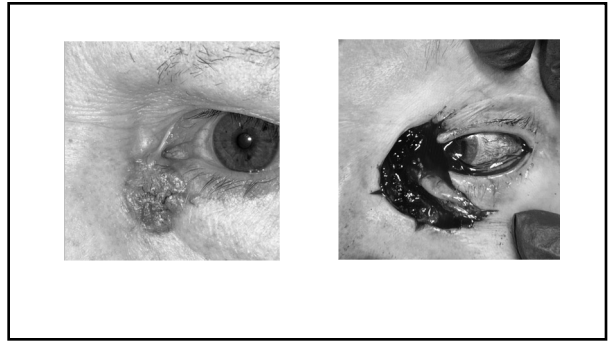
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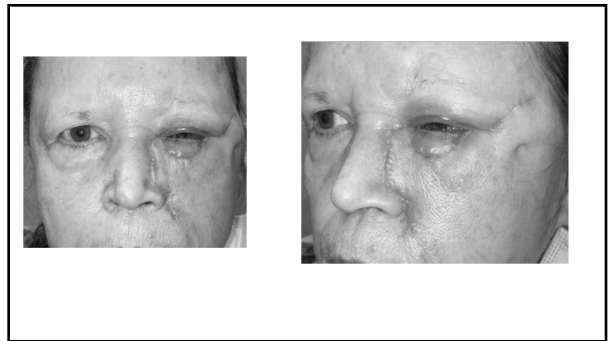
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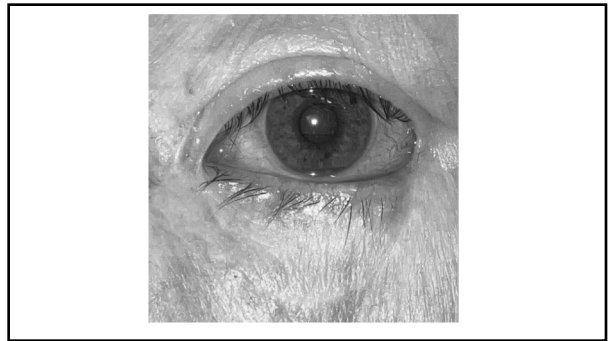
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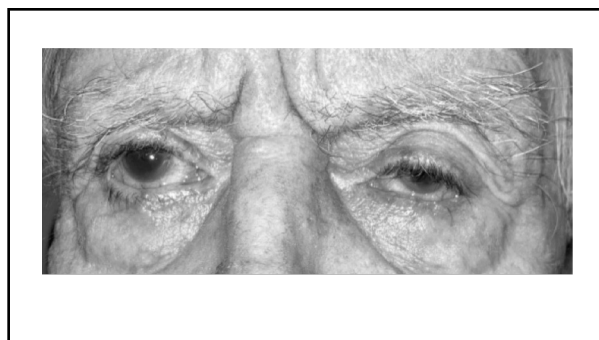
• Question #4  
Is the contralateral lower eyelid lax enough to harvest a composite graft?

• This can turn a 60% defect into a 30% defect

38



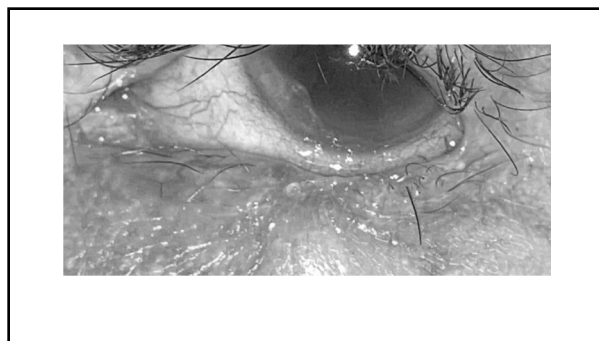
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### Upper eyelid defects

- Question #1  
Is there enough anterior lamella available to recruit to allow eye closure?

43



44



45



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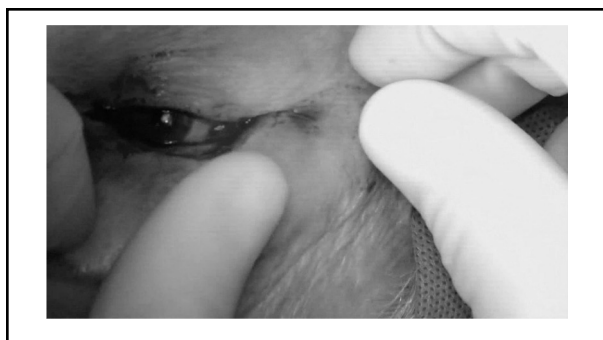
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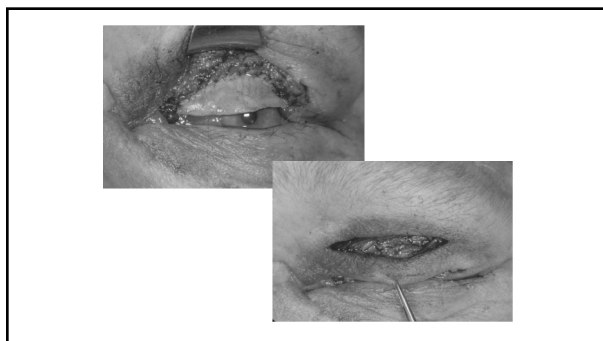


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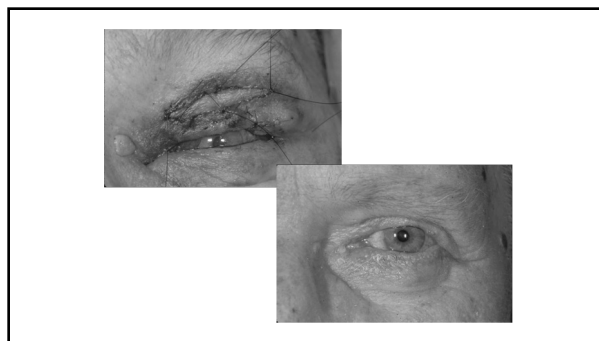
• Question #2  
If there is not enough anterior lamella available, is there enough to cover and support a free tarsal graft?

• Allow a bipedicle flap with creation of an anterior lamellar defect that can be repair with a skin graft from the contralateral upper eyelid.

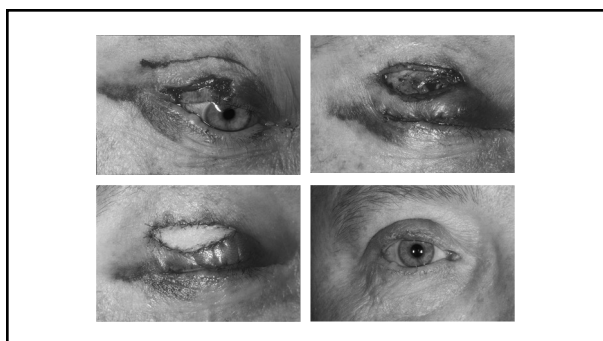
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54




55

Thank you!

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- Over 350 narrated, edited videos!

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An Instagram logo icon is centered above the text "OCULOSURG". The entire graphic is enclosed in a thin black border with corner brackets.

56



UCLA Shain Eye Institute

# Rejuvenation of the lower eyelids & mid face

Kelsey A Roelofs MD FRCS  
 Oculofacial Plastic Surgeon  
 Assistant Professor  
 Departments of Ophthalmology & Neurosurgery  
 University of California, Los Angeles

UCLA Shain Eye Institute

# Rejuvenation of the lower eyelids & mid face

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No financial disclosures or conflicts of interest

UCLA Shain Eye Institute

## Objectives

To review a **conceptual approach** to lower eyelid & midface rejuvenation

Discuss **non-surgical** and **surgical** options for lower eyelid rejuvenation

conceptual approach    non-surgical    surgical    UCLA Shain Eye Institute

IN YOUTH

- Skin
- Orbicularis
- Orbital fat
- SOOF
- Malar fat pad
- Orbital rim

conceptual approach    non-surgical    surgical    UCLA Shain Eye Institute

IN YOUTH      WITH AGEING

Descent & Deflation +/- Protrusion of orbital fat


Increased shadow

- Skin
- Orbicularis
- Orbital fat
- SOOF
- Malar fat pad
- Orbital rim

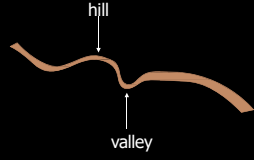
conceptual approach    non-surgical    surgical    UCLA Shain Eye Institute

IN YOUTH      WITH AGEING


Increased shadow

conceptual approach    non-surgical    surgical    

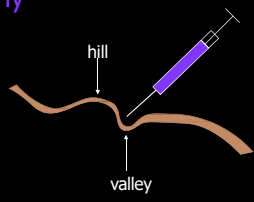
### 1. Topography




If the hill is **minimal**, focus on **filling** the valley

conceptual approach    non-surgical    surgical    

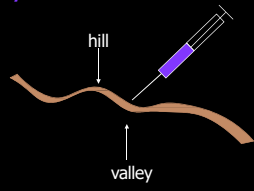
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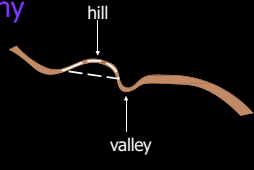
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If the hill is **minimal**, focus on **filling** the valley


conceptual approach    non-surgical    surgical    

### 1. Topography

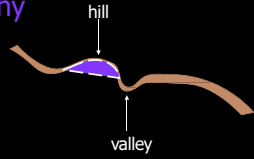


If the hill is **minimal**, focus on **filling** the valley

If the hill is **moderate**, consider filling the valley with **volume from the hill**


conceptual approach    non-surgical    surgical    

### 1. Topography

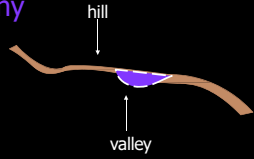


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conceptual approach    non-surgical    surgical    

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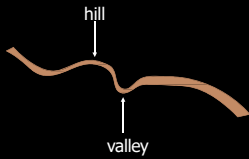


If the hill is **minimal**, focus on **filling** the valley

If the hill is **moderate**, consider filling the valley with **volume from the hill**

conceptual approach    non-surgical    surgical    **UCLA Skin Eye Institute**

**1. Topography**



hill  
valley

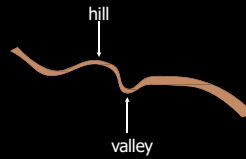
**2. Skin**

Quantity vs Quality

Surgery    Peels  
Lasers  
Skin care

conceptual approach    non-surgical    surgical    **UCLA Skin Eye Institute**

**1. Topography**



hill  
valley

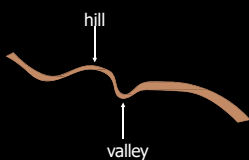
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conceptual approach    non-surgical    surgical    **UCLA Skin Eye Institute**

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hill  
valley

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Quantity vs Quality

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Skin care

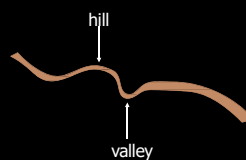
Rhytides

Dynamic vs Static

Neurotoxic

conceptual approach    non-surgical    surgical    **UCLA Skin Eye Institute**

**1. Topography**



hill  
valley

**2. Skin**

Quantity vs Quality

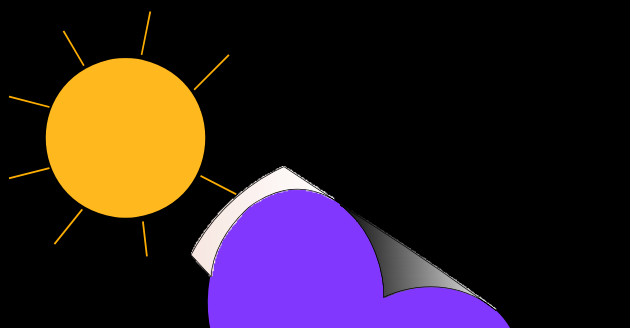
Surgery    Peels  
Lasers  
Skin care

Rhytides

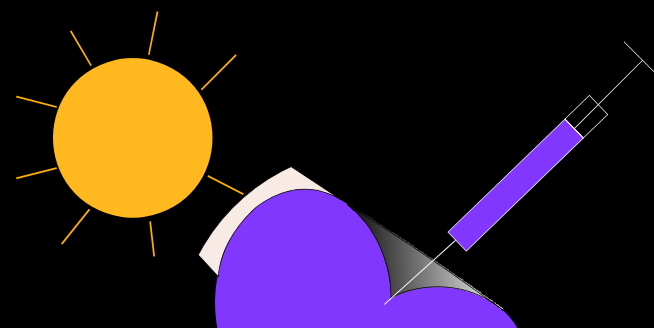
Dynamic vs Static

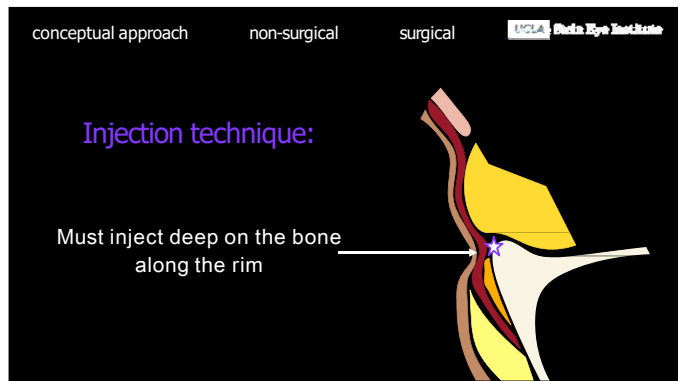
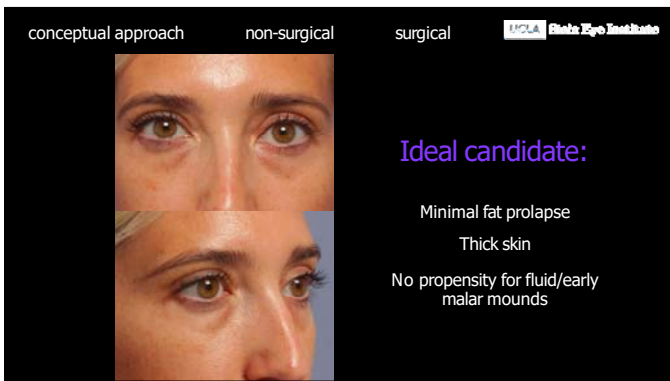
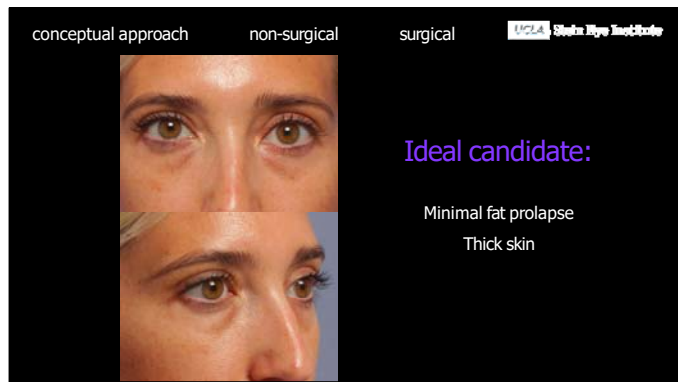
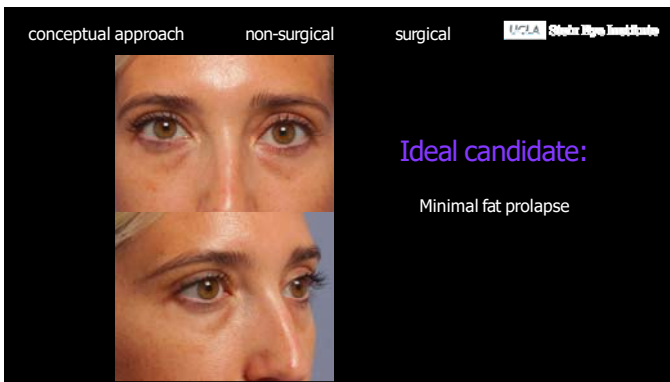
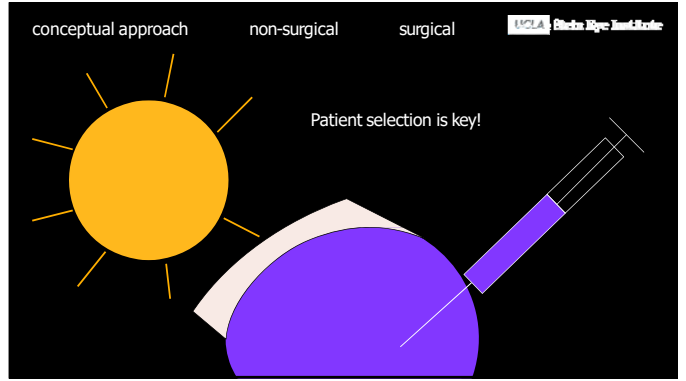
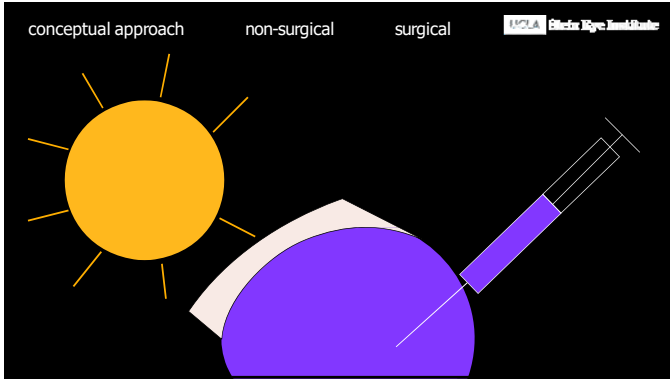
Neurotoxic

conceptual approach    non-surgical    surgical    **UCLA Skin Eye Institute**



conceptual approach    non-surgical    surgical    **UCLA Skin Eye Institute**





conceptual approach    non-surgical    surgical    UCLA Shain Eye Institute

**Injection technique:**

Ideally <math><0.2 - 0.25\text{ cc}</math> per side

More filler = More problems

conceptual approach    non-surgical    surgical    UCLA Shain Eye Institute

**Complications:**    swelling    blue hue    lumps & bumps    blindness

1. Early
2. Doughy
3. Inflammatory

conceptual approach    non-surgical    surgical    UCLA Shain Eye Institute

**Complications:**    swelling    blue hue    lumps & bumps    blindness

1. Early

Pre

24 hr post

conceptual approach    non-surgical    surgical    UCLA Shain Eye Institute

**Complications:**    swelling    blue hue    lumps & bumps    blindness

1. Early

H2O

H2O

H2O

H2O

Hyaluronic Acid

Pre

24 hr post

conceptual approach    non-surgical    surgical    UCLA Shain Eye Institute

**Complications:**    swelling    blue hue    lumps & bumps    blindness

1. Early

Hyaluronic Acid Gel Fillers

Differ in concentration, particle size and cross linking technology

↓

Leads to differences in

$G'$     Cohesivity    Hydrophilicity

Pre

24 hr post

conceptual approach    non-surgical    surgical    UCLA Shain Eye Institute

**Complications:**    swelling    blue hue    lumps & bumps    blindness

1. Early

Hyaluronic Acid Gel Fillers

**Hydrophilicity**

Belotero Balance	High
RHA 3	
RHA 2	
Restylane Kysse	
RHA4	
Restylane Defyne	
RHA1	
Juvederm Voluma XC	
Juvederm Vollure XC	
Juvederm Volbella XC	
Restylane L    Restylane Eyelight	
Restylane Lyft	
Restylane Silk	Low

Pre


24 hr post

conceptual approach    non-surgical    surgical    **UCLA** **Shain Eye Institute**

**Complications:**    swelling    blue hue    lumps & bumps    blindness

1. Early


No way to prevent, helpful to pre-emptively prepare patients




conceptual approach    non-surgical    surgical    **UCLA** **Shain Eye Institute**

**Complications:**    swelling    blue hue    lumps & bumps    blindness

2. Doughy

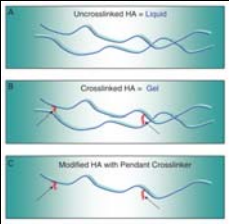



conceptual approach    non-surgical    surgical    **UCLA** **Shain Eye Institute**

**Complications:**    swelling    blue hue    lumps & bumps    blindness

2. Doughy

Progressive breakdown of BDDE (**less cross linking**) increases exposure of HA chains for H2O binding

conceptual approach    non-surgical    surgical    **UCLA** **Shain Eye Institute**


**Complications:**    swelling    blue hue    lumps & bumps    blindness

2. Doughy

Progressive breakdown of BDDE (**less cross linking**) increases exposure of HA chains for H2O binding

**Hydrophilicity**  
High

Restylane L    Restylane Eyelight  
Low



conceptual approach    non-surgical    surgical    **UCLA** **Shain Eye Institute**


**Complications:**    swelling    blue hue    lumps & bumps    blindness

2. Doughy

Progressive breakdown of BDDE (**less cross linking**) increases exposure of HA chains for H2O binding

**Hydrophilicity**  
High


Restylane L    Restylane Eyelight  
Low




conceptual approach    non-surgical    surgical    **UCLA** **Shain Eye Institute**

**Complications:**    swelling    blue hue

2. Doughy



HA particles bind to a range of cellular and extracellular proteins, **upregulating cytokines and recruiting inflammatory cells**, resulting in **vasogenic edema**



conceptual approach    non-surgical    surgical    **UCLA** **Skincare Institute**

**Complications:**    swelling    blue hue    lumps & bumps    blindness

2. Doughy

Sometimes patients have a hard time seeing this and often **come in asking for more filler**

0 years post  
1 years post  
8 years post

conceptual approach    non-surgical    surgical    **UCLA** **Skincare Institute**

**Complications:**    swelling    blue hue    lumps & bumps    blindness

2. Doughy

Hyaluronidase +/- RF microneedling

0 years post  
1 years post  
8 years post

2 weeks post hyaluronidase

conceptual approach    non-surgical    surgical    **UCLA** **Skincare Institute**

**Complications:**    swelling    blue hue    lumps & bumps    blindness

2. Doughy

Hyaluronidase +/- RF microneedling

0 years post  
1 years post  
8 years post

2 weeks post hyaluronidase

conceptual approach    non-surgical    surgical    **UCLA** **Skincare Institute**

**Complications:**    swelling    blue hue    lumps & bumps    blindness

3. Inflammatory

2 months post HA filler

conceptual approach    non-surgical    surgical    **UCLA** **Skincare Institute**

**Complications:**    swelling    blue hue    lumps & bumps    blindness

3. Inflammatory

Causes of 'hot edema' following filler injection:

Infection

2 months post HA filler

Aspiration of purulent material

conceptual approach    non-surgical    surgical    **UCLA** **Skincare Institute**

**Complications:**    swelling    blue hue    lumps & bumps    blindness

3. Inflammatory

Causes of 'hot edema' following filler injection:

Infection  
Biofilm

2 months post HA filler

RESEARCH ARTICLES

Bacterial biofilm formation and treatment in soft tissue fillers  
Shahar M, Wang J, Dwyer D, ...

The Role of Bacterial Biofilm in Adverse Soft-Tissue Filler Reactions: A Combined Laboratory and Clinical Study

ORIGINAL ARTICLES

Relationship Between Delayed Reactions to Dermal Fillers and Biofilms: Facts and Considerations  
Shahar M, ...

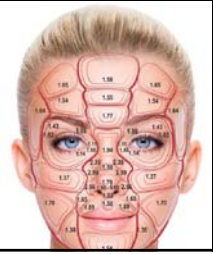







conceptual approach    non-surgical    surgical    UCLA **Skincare Eye Institute**

**Complications:**    swelling    blue hue    lumps & bumps    blindness




Eyelid skin is very **THIN**




conceptual approach    non-surgical    surgical    UCLA **Skincare Eye Institute**

**Complications:**    swelling    blue hue    lumps & bumps    blindness




Eyelid skin is very **THIN**



Margin for error resulting in noticeable contour irregularities is **SMALL**

conceptual approach    non-surgical    surgical    UCLA **Skincare Eye Institute**

**Complications:**    swelling    blue hue    lumps & bumps    blindness




Injecting within the orbicularis can lead to significant contour issues

conceptual approach    non-surgical    surgical    UCLA **Skincare Eye Institute**

**Complications:**    swelling    blue hue    lumps & bumps    blindness






Contour irregularities can occur when **too much** is injected in the wrong spot

conceptual approach    non-surgical    surgical    UCLA **Skincare Eye Institute**

**Complications:**    swelling    blue hue    lumps & bumps    **blindness**

- 23 y.o. male, injected by family member at home in glabellar region "all of a sudden" noted numbness, ptosis and vision loss on the right
- Examination:
  - VA OD NLP
  - Complete ophthalmoplegia
  - Fixed iris, hypopyon, pale nerve

conceptual approach    non-surgical    surgical    UCLA **Skincare Eye Institute**

**Complications:**    swelling    blue hue    lumps & bumps    **blindness**

- Many reports and reviews: >100 reported cases in literature



Hyperbaric Oxygen Therapy to Avoid Blindness From Filler Posterior Ciliary Artery Occlusion Caused by Hyaluronic Acid Injections Into the Forehead: A Case Report

Journal of Cutaneous Medicine and Surgery

MASTERS CASE PRESENTATION: Ischemic oculomotor nerve palsy due to hyaluronic acid filler injection

MASTERS CASE PRESENTATION: Severe vision loss caused by cosmetic filler augmentation: Case series with review of cause and therapy

MASTERS CASE PRESENTATION: Cosmetic Facial Fillers and Severe Vision Loss

Blindness Caused by Cosmetic Filler Injections: A Review of Cause and Therapy

conceptual approach    non-surgical    surgical    **UCLA** **Shain Eye Institute**

**Complications:**    swelling    blue hue    lumps & bumps    **blindness**

- Many reports and reviews: >100 reported cases in literature
- Many expert recommendations regarding prevention and therapy

**Avoidance of Arterial Occlusion From Injection of Soft Tissue Fillers**

**Blindness Caused by Cosmetic Filler Injection: A Review of Cause and Therapy**

**Prevention and management of vision loss relating to facial filler injections**

**Complications of Intra-arterial Filler Injections**

conceptual approach    non-surgical    surgical    **UCLA** **Shain Eye Institute**

**Complications:**    swelling    blue hue    lumps & bumps    **blindness**

**'Classic' theory**

- Injection in vessel lumen
- Column injected retrograde
- Past takeoff of CRA
- Injection stops
- Blood carries particles forward to retina as flow is restored

**Avoidance of Arterial Occlusion From Injection of Soft Tissue Fillers**

**Blindness Caused by Cosmetic Filler Injection: A Review of Cause and Therapy**

**Prevention and management of vision loss relating to facial filler injections**

**Complications of Intra-arterial Filler Injections**

*Is this plausible?*

conceptual approach    non-surgical    surgical    **UCLA** **Shain Eye Institute**

**Complications:**    swelling    blue hue    lumps & bumps    **blindness**

**Alternative theory: Embolism**

- Injection in vessel lumen
- Collateral flow is towards the orbit
- Embolism injected antegrade

**Retrograde Column**

**'Classic' theory**

**Antegrade embolus**

**'Alternative' theory**

conceptual approach    non-surgical    surgical    **UCLA** **Shain Eye Institute**

**Complications:**    swelling    blue hue    lumps & bumps    **blindness**

**The treatment of hyaluronic acid aesthetic interventional induced visual loss (AIIVL): A consensus on practical guidance**

M Dahi Hamzah FRCS(Plast) | Saj Atallah FRCS(Plast) | ChenAn Chiang MD | Ramon Mathews FRCS(Plast) | Robert Goldberg MD

1. IV acetazolamide
2. Inferotemporal peribulbar injection of Hyaluronase - specialist intervention
3. Dose 1500 IU
4. Hourly repeat?
5. Anterior chamber paracentesis and withdrawal of 0.1-0.2 ml aqueous.
6. Sublingual GTN
7. Superselective Intra-arterial thrombolysis - no reperfusion
8. High risk CV haemorrhage
9. ? IV Urokinase & Hyalase - High doses
10. High dose infiltration of Hyalase around supratrochlear notch

conceptual approach    non-surgical    surgical    **UCLA** **Shain Eye Institute**

**Complications:**    swelling    blue hue    lumps & bumps    **blindness**

**The treatment of hyaluronic acid aesthetic interventional induced visual loss (AIIVL): A consensus on practical guidance**

M Dahi Hamzah FRCS(Plast) | Saj Atallah FRCS(Plast) | ChenAn Chiang MD | Ramon Mathews FRCS(Plast) | Robert Goldberg MD

1. IV acetazolamide
2. Inferotemporal peribulbar injection of Hyaluronase - specialist intervention
3. Dose 1500 IU
4. Hourly repeat?
5. Anterior chamber paracentesis and withdrawal of 0.1-0.2 ml aqueous.
6. Sublingual GTN
7. Superselective Intra-arterial thrombolysis - no reperfusion
8. High risk CV haemorrhage
9. ? IV Urokinase & Hyalase - High doses
10. High dose infiltration of Hyalase around supratrochlear notch
10. No cases of revascularisation reported

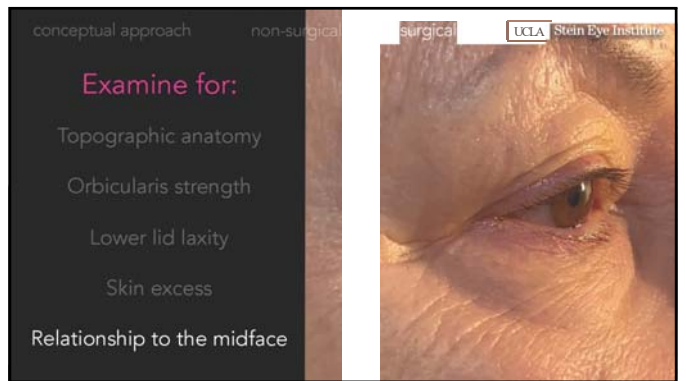
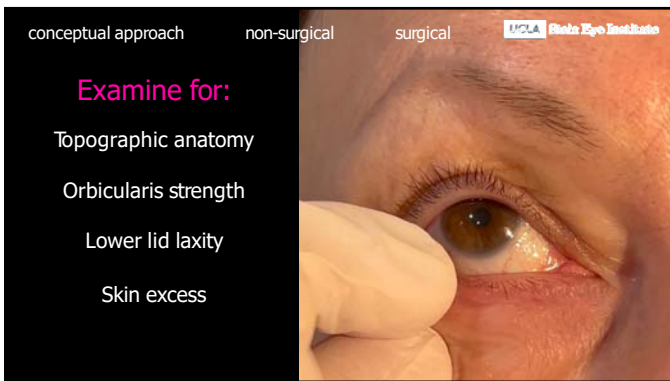
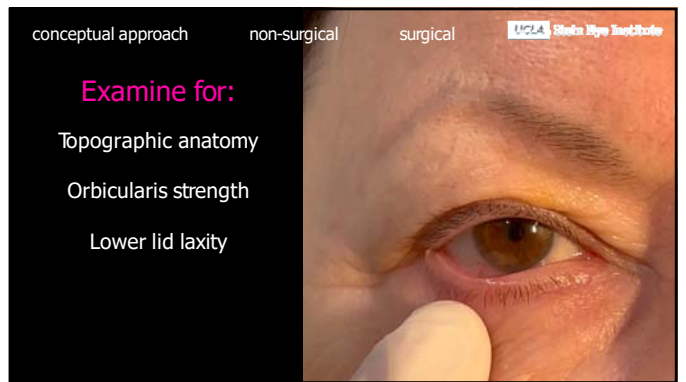
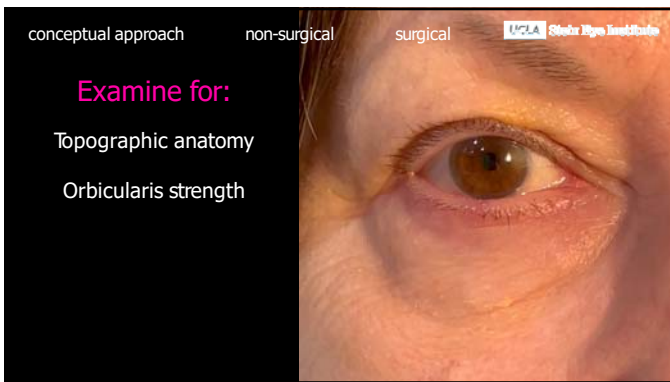
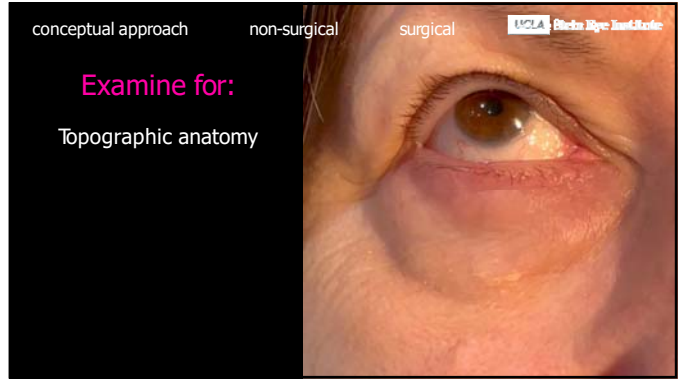
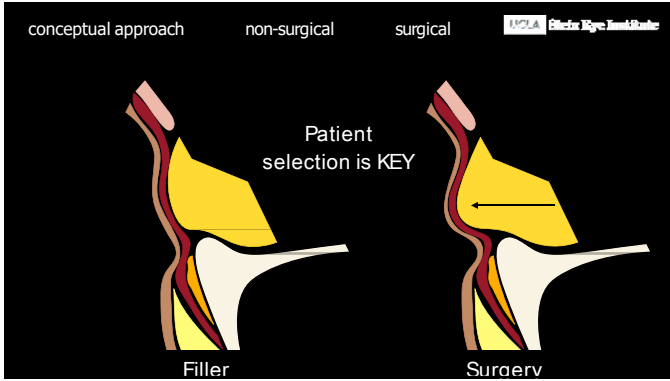
**Support the patient and referring provider**

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**BEFORE**

**AFTER**

0.2 cc Restylane L per side



conceptual approach    non-surgical    surgical    **UCLA** **Shain Eye Institute**

**Examine for:**

- Topographic anatomy
- Orbicularis strength
- Lower lid laxity
- Skin excess
- Relationship to the midface

**Customised plan:**

Management of volume

1. Orbital fat  
Excision vs Transposition

conceptual approach    non-surgical    surgical    **UCLA** **Shain Eye Institute**

**Examine for:**

- Topographic anatomy
- Orbicularis strength
- Lower lid laxity
- Skin excess
- Relationship to the midface

**Customised plan:**

Management of volume

1. Orbital fat  
Excision vs Transposition
2. Need for fat grafting?

conceptual approach    non-surgical    surgical    **UCLA** **Shain Eye Institute**

**Examine for:**

- Topographic anatomy
- Orbicularis strength
- Lower lid laxity
- Skin excess
- Relationship to the midface

**Customised plan:**

Management of volume

Address the skin

1. Quantity  
Skin pinch or flap if ++

conceptual approach    non-surgical    surgical    **UCLA** **Shain Eye Institute**

**Examine for:**

- Topographic anatomy
- Orbicularis strength
- Lower lid laxity
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- Relationship to the midface

**Customised plan:**

Management of volume

Address the skin

1. Quantity  
Skin pinch or flap if ++
2. Quality  
Laser, Peel, Skincare

conceptual approach    non-surgical    surgical    **UCLA** **Shain Eye Institute**

**Examine for:**

- Topographic anatomy
- Orbicularis strength
- Lower lid laxity
- Skin excess
- Relationship to the midface

**Customised plan:**

Management of volume

Address the skin

Lower lid laxity

If moderate to significant, consider canthoplasty

