

Model Guided Medicine

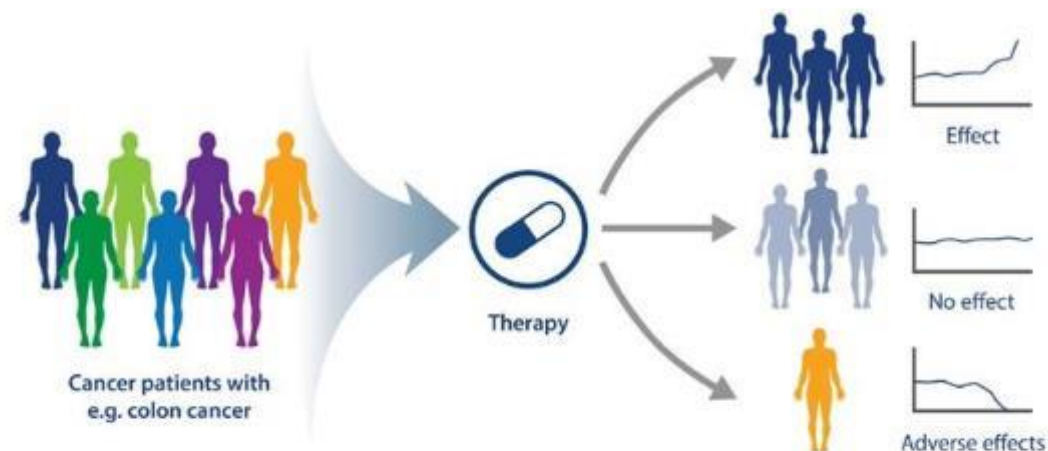
A practical use case in Plastic Surgery: Blepharoplasty

By Dr. H. Herrero Antón de Vez

Introduction

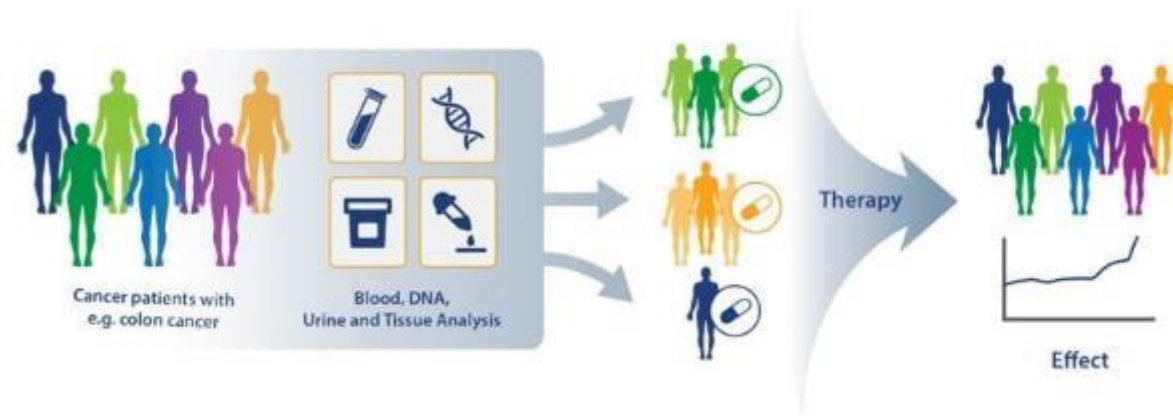
Current Medicine

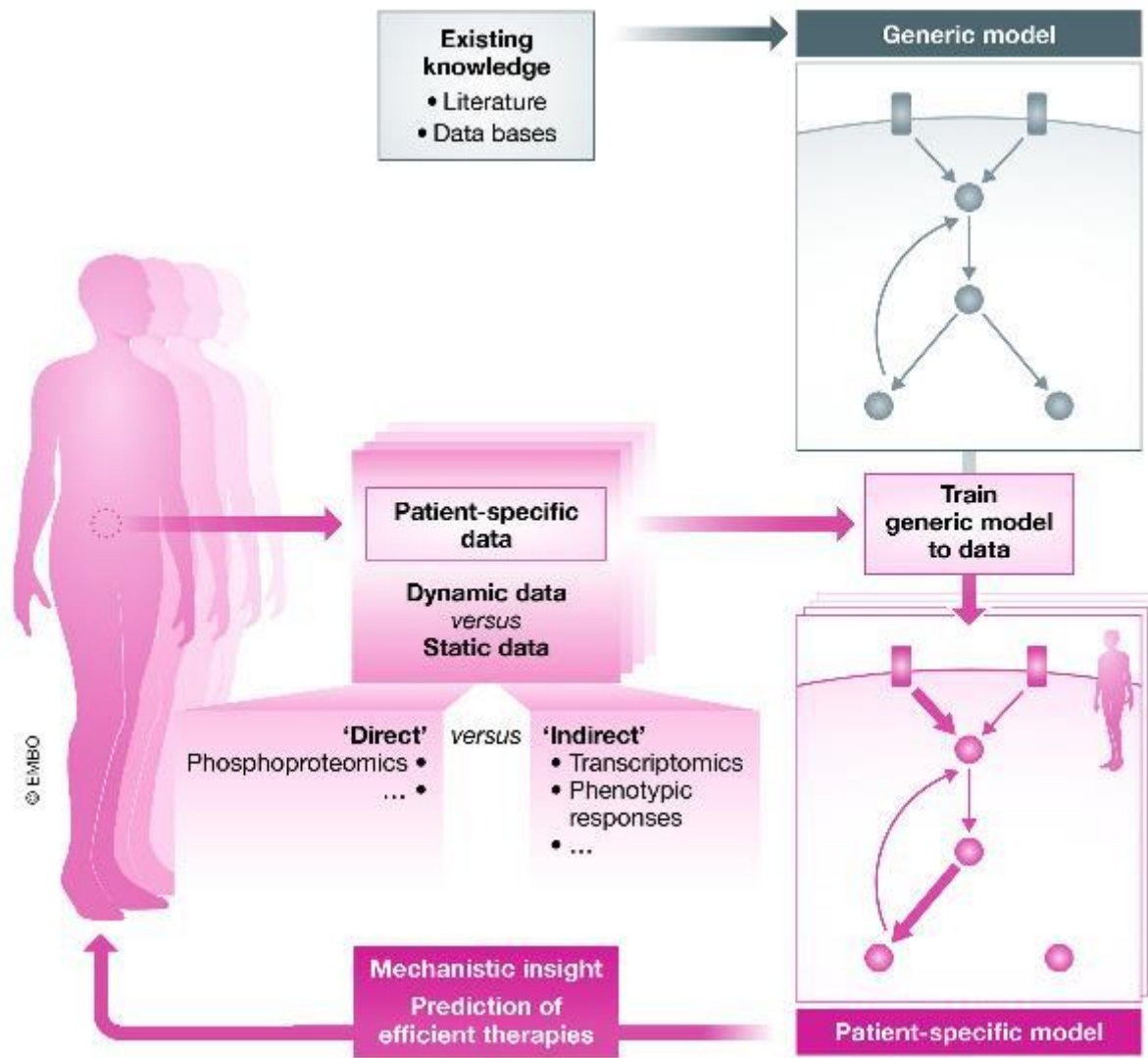
One Treatment Fits All



Future Medicine

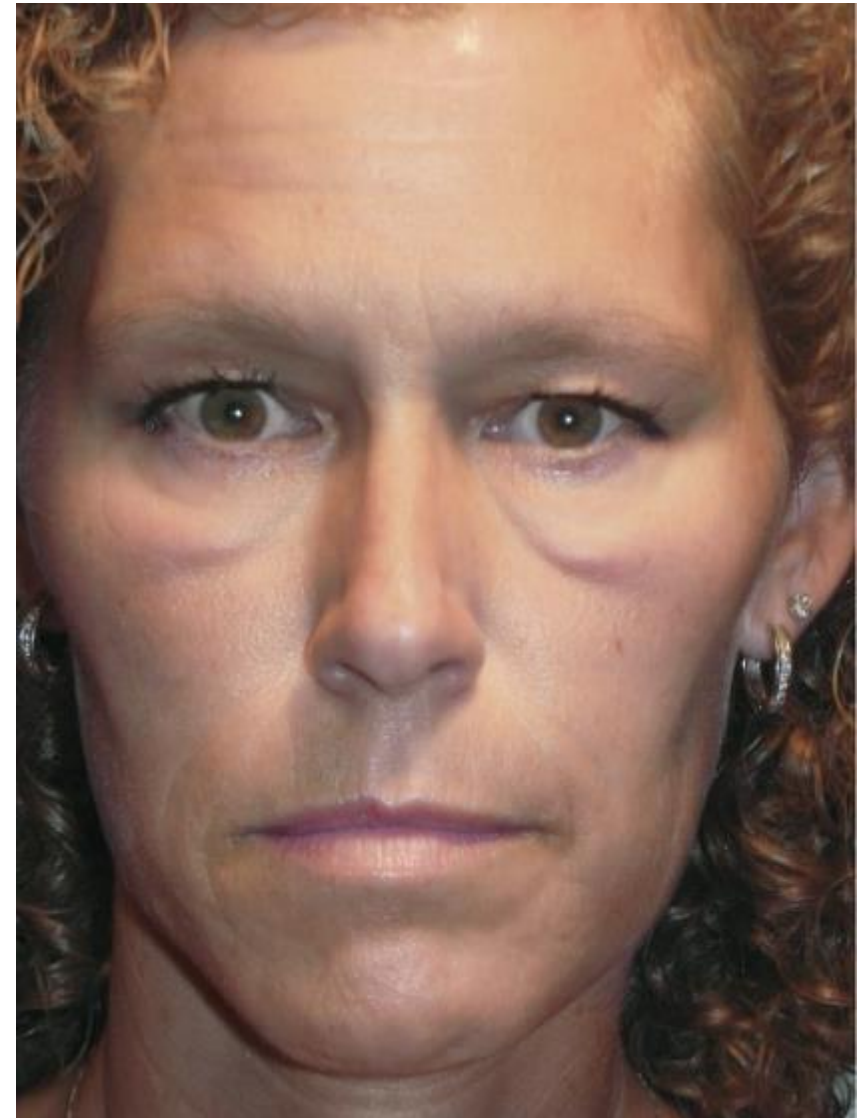
More Personalized Diagnostics





J. Saez-Rodriguez, N. Blüthgen.
Personalized signaling models for personalized treatments. Mol Syst Biol. (2020) 16: e9042; Pag. 1744-4292.
<https://doi.org/10.15252/msb.20199042>

What the hell does it have to do
with plastic surgery?



Festoons

Prolapsed malar bags due to
prolapsed orbicullis oculi.
(VS Edema)



Blepharoptosis

Watch Out **Hering's law!!**

Law of equal innervation

=

eye muscles or eyelid muscles of each
eye are equally innervated.



Blepharochalasis:

Painless recurrent edema of the eyelid
(Dermatochalasis = *Cutis laxa*)

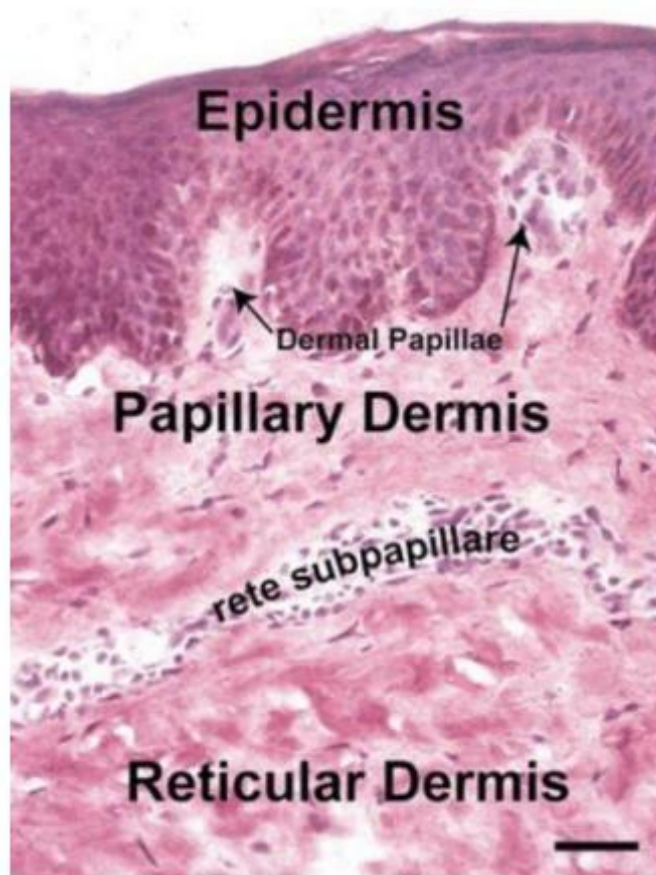
Too much!

Let's choose one topic:

Treatment of lower eyelid aging



Rembrandt Self-Portraits (1606-1669)



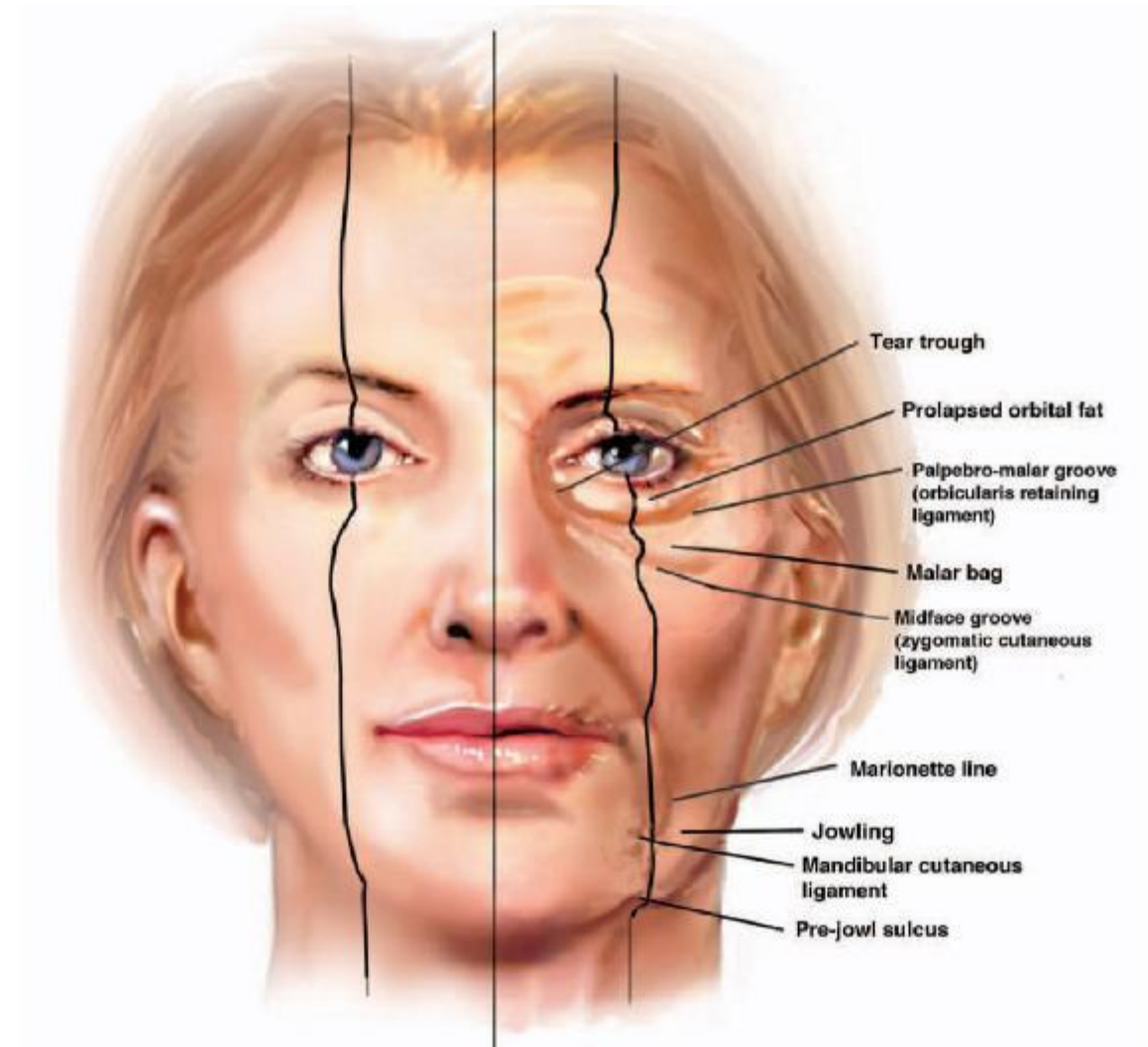
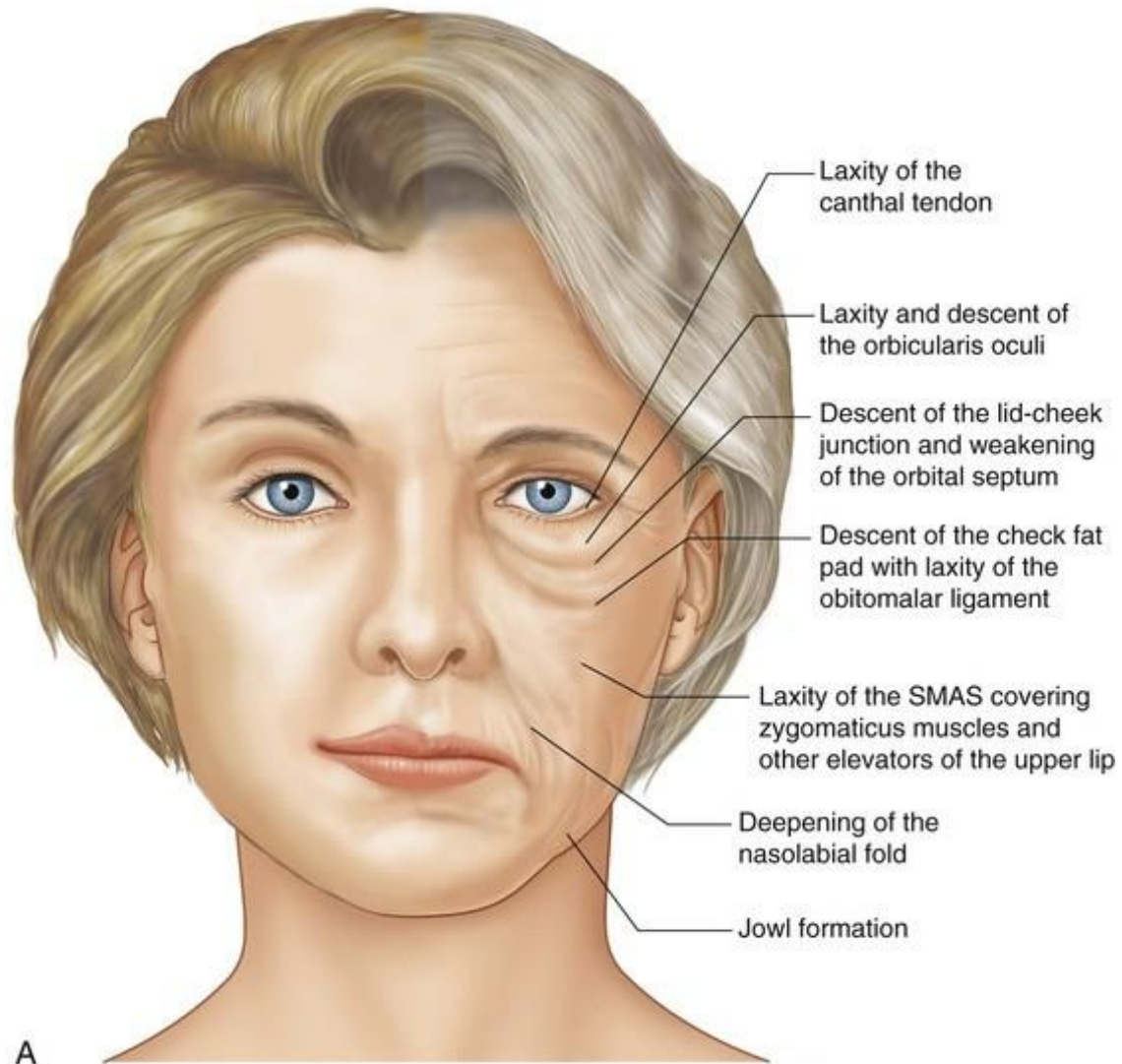
Photoageing

- **Thinning of Papillary Dermis** → Collagen Synthesis by fibrocytes (reduction 1% /year of adult life)
- **Compact collagen in thick coarse bundles**
- **Reduction Elastin and fragmentation (amorphous elastic fibers)**
- **Decreasing and redistribution of Subcutaneous Fat**
- **Skin Laxity**
- **Wrinkling & Rhytids**
- **Slower healing**

Andrea Heinz, Elastic fibers during aging and disease, Ageing Research Reviews, Volume 66, 2021, 101255, ISSN 1568-1637, <https://doi.org/10.1016/j.arr.2021.101255>.

Photoageing

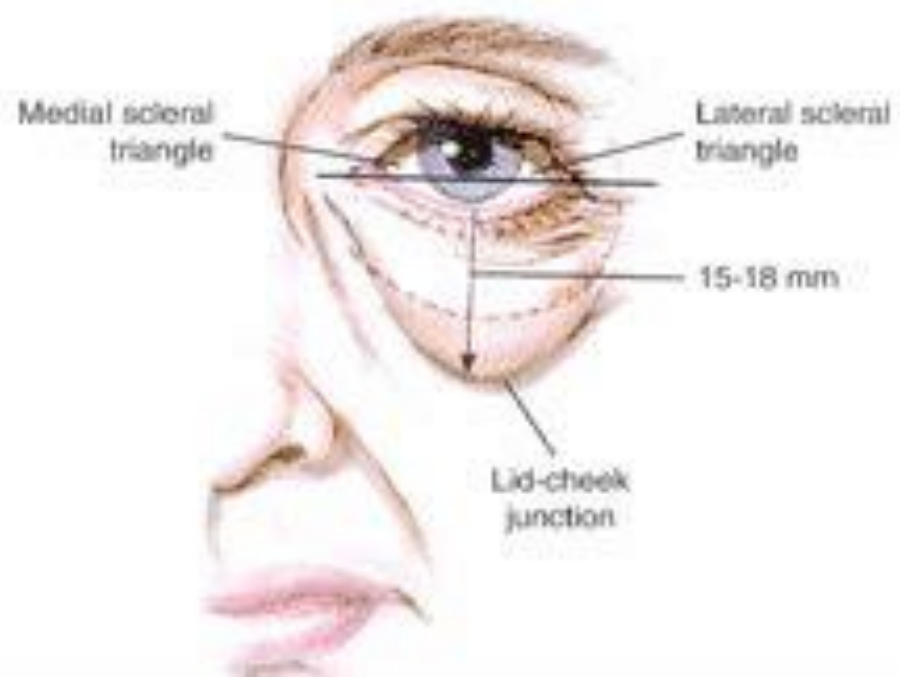
Dermal atrophy with reduction of fibroblasts and hyaluronic acid
Decreased subdermal fat
Increased degeneration of elastin and abnormal elastic fibers in dermis (solar elastosis)
Increased destruction of collagen fibers with homogenization of collagen fibers
Increased mast cells around blood vessels



YOUTHFUL EYE

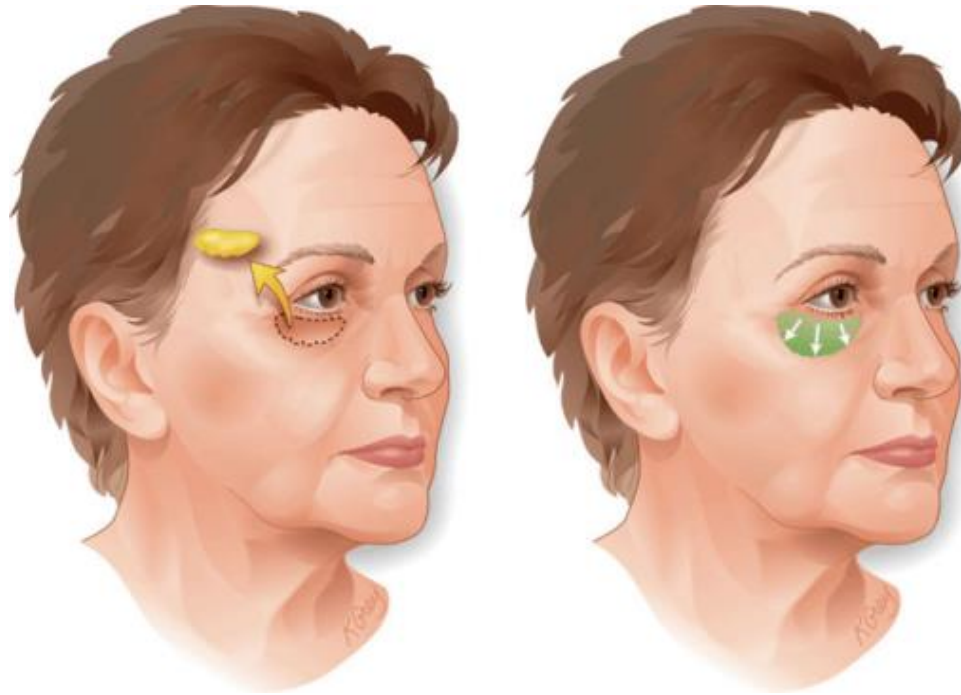


AGED EYE



Inferior Blepharoplasty

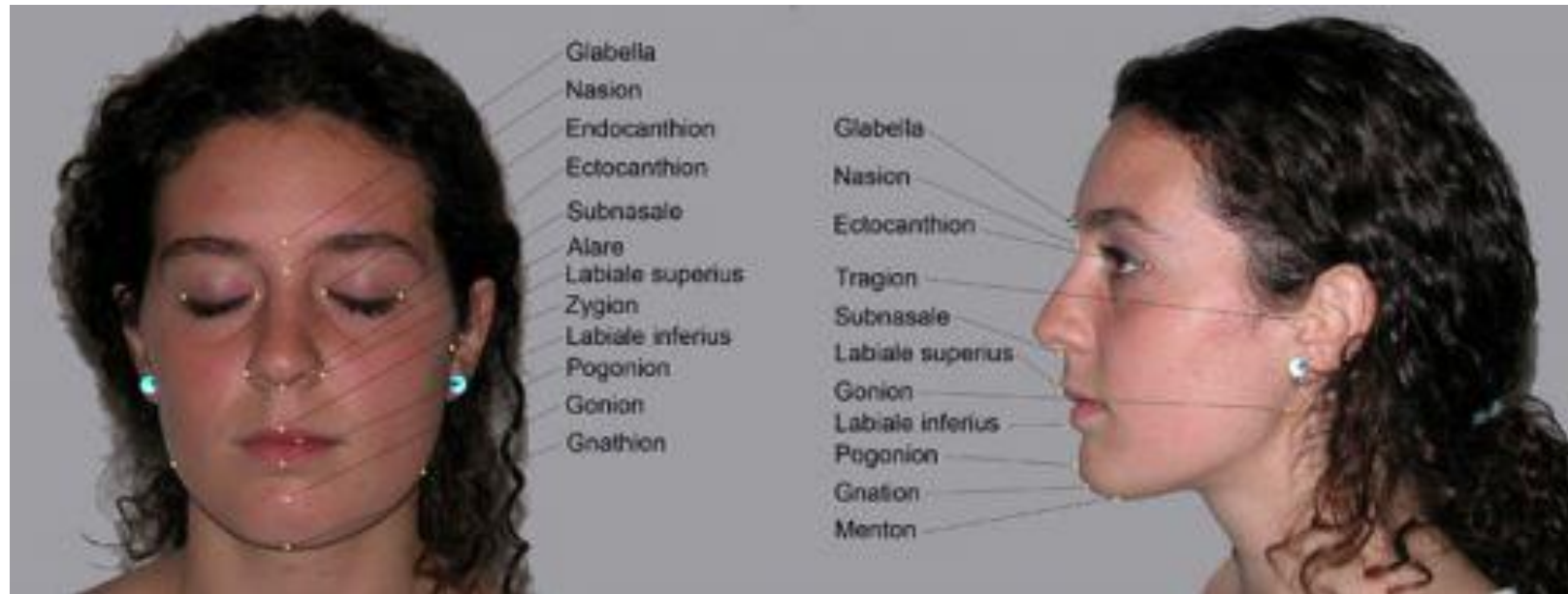
FAT



SKIN

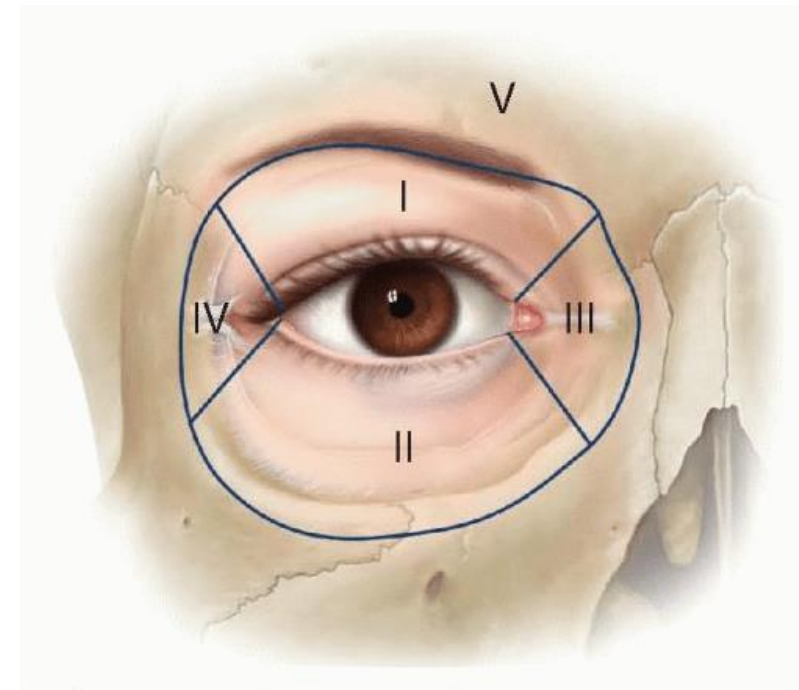
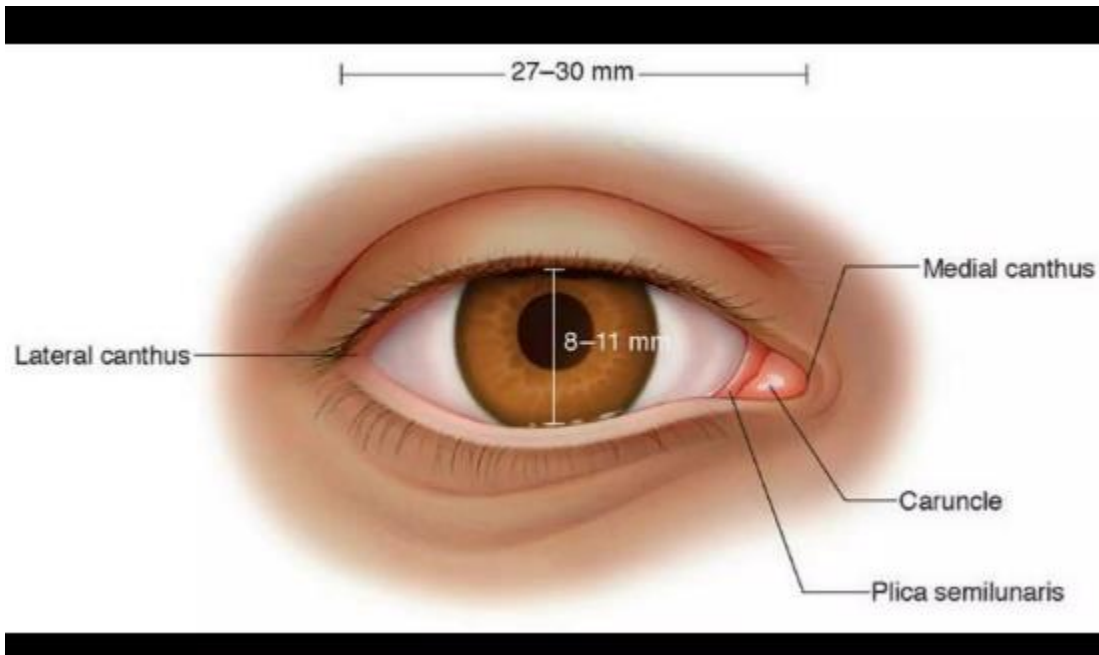
Karl Ferdinand von Gräfe -- blepharoplasty (1818)
Repairing deformities caused by cancer in the eyelids.

Anatomy & Anthropometric measurements



Anatomy & Anthropometric measurements

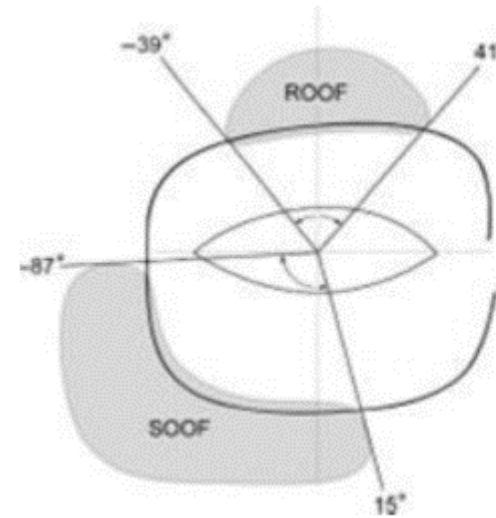
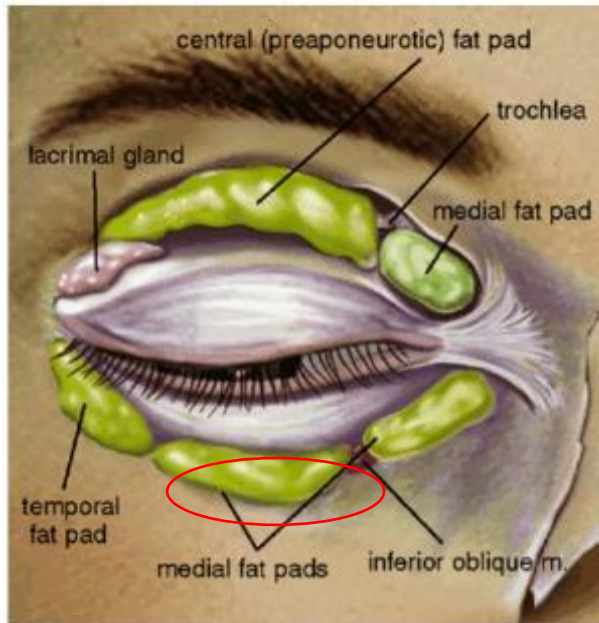
The five zones of the periorbital region.



Lateral canthus or lateral retinaculum (zone IV) is a three-dimensional fibrous structure that connects the upper and lower tarsal plates to the Whitnall tubercle, located 8 mm posterior to the lateral orbital rim

Grabb and Smith's Plastic Surgery (GRABB'S PLASTIC SURGERY) Seventh Ed
CHAPTER 32 RECONSTRUCTION OF THE EYELIDS, CORRECTION OF PTOSIS, AND CANTHOPLASTY

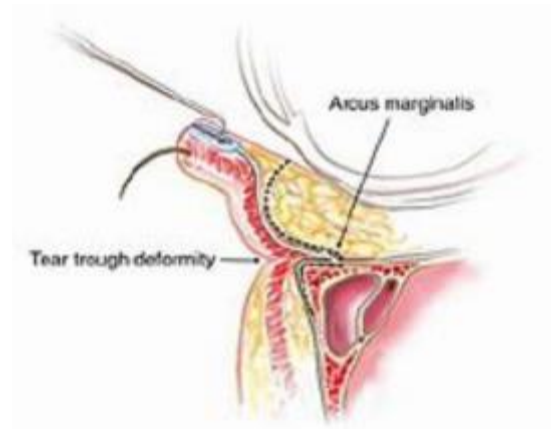
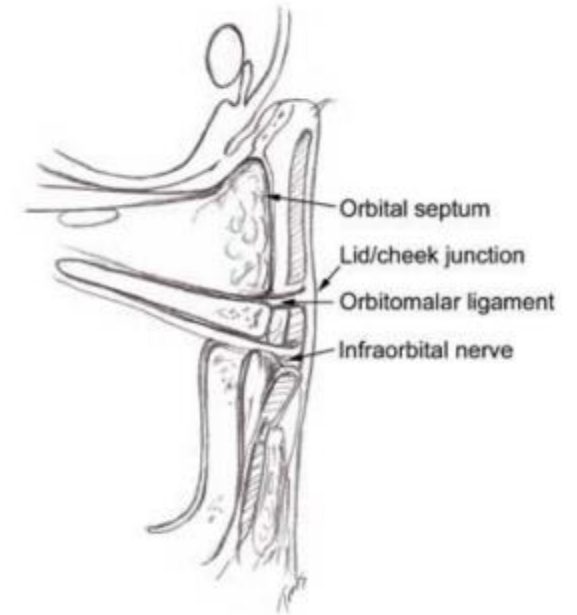
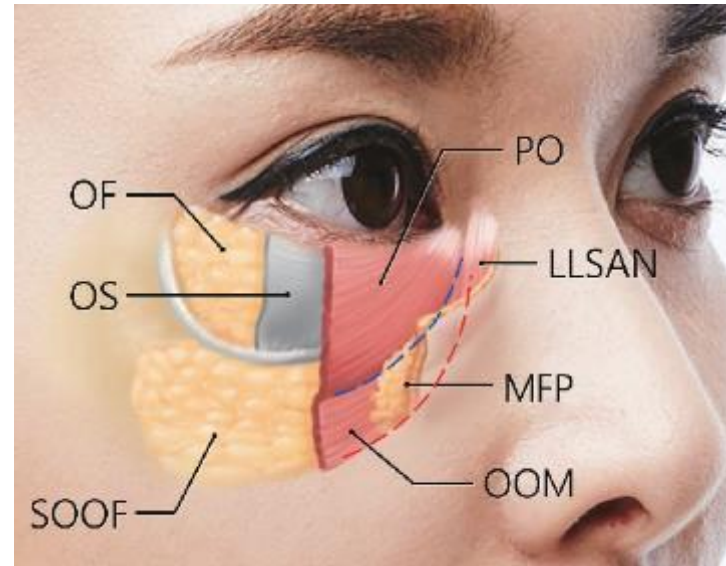
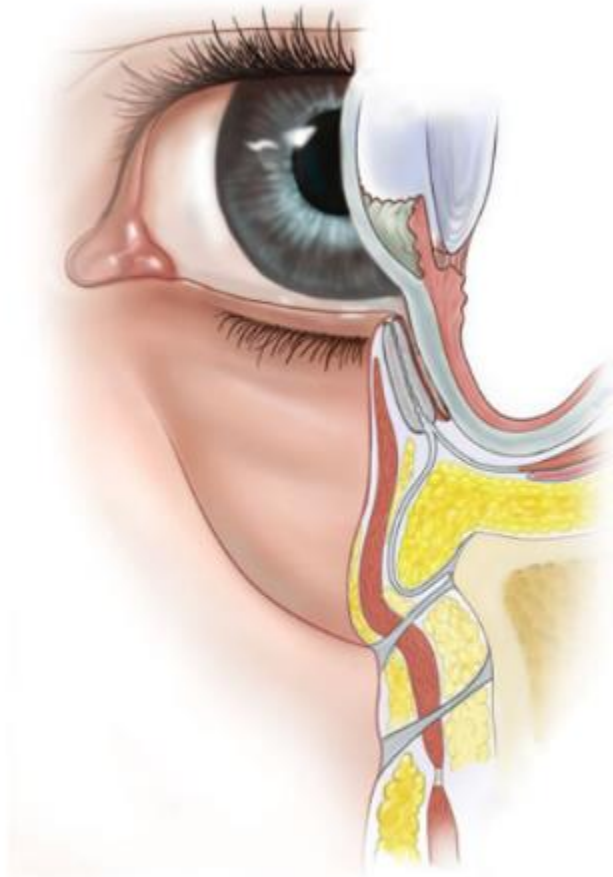
Anatomy & Anthropometric measurements



Suborbicularis fat pat
(SOOF) - fat deep to the
orbicularis muscle

3X Compartments of Retroseptal fat.
WO: IOM injury by transcutaneous fat excision.

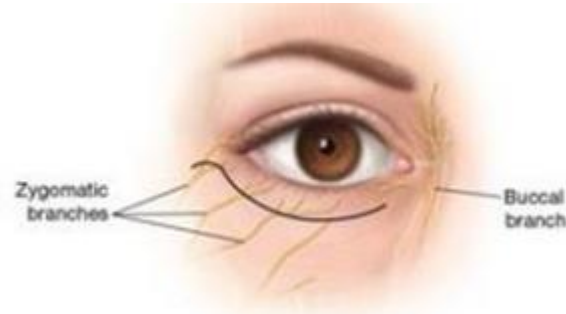
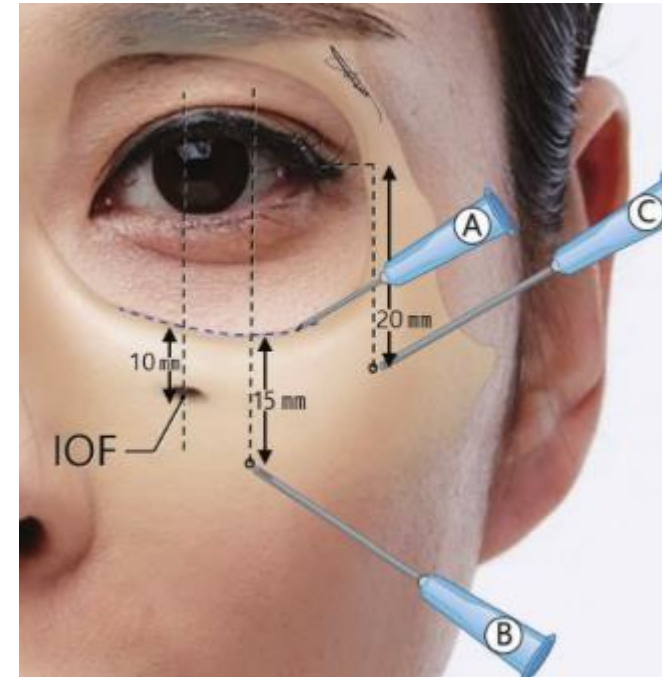
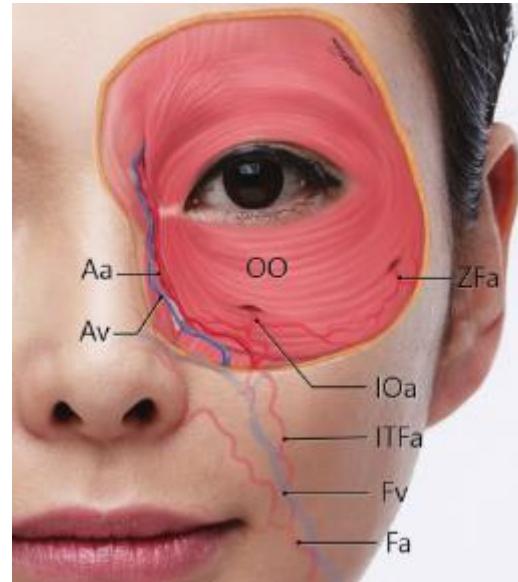
Anatomy & Anthropometric measurements



Arcus marginalis = Periostium to Periorbitum

Anatomy & Anthropometric measurements

- Angular Artery
- Angular Vein
- Zygomaticofacial Artery
- Infraorbital Artery
- Infraorbicular trunk of facial Artery



Anatomy & Anthropometric measurements

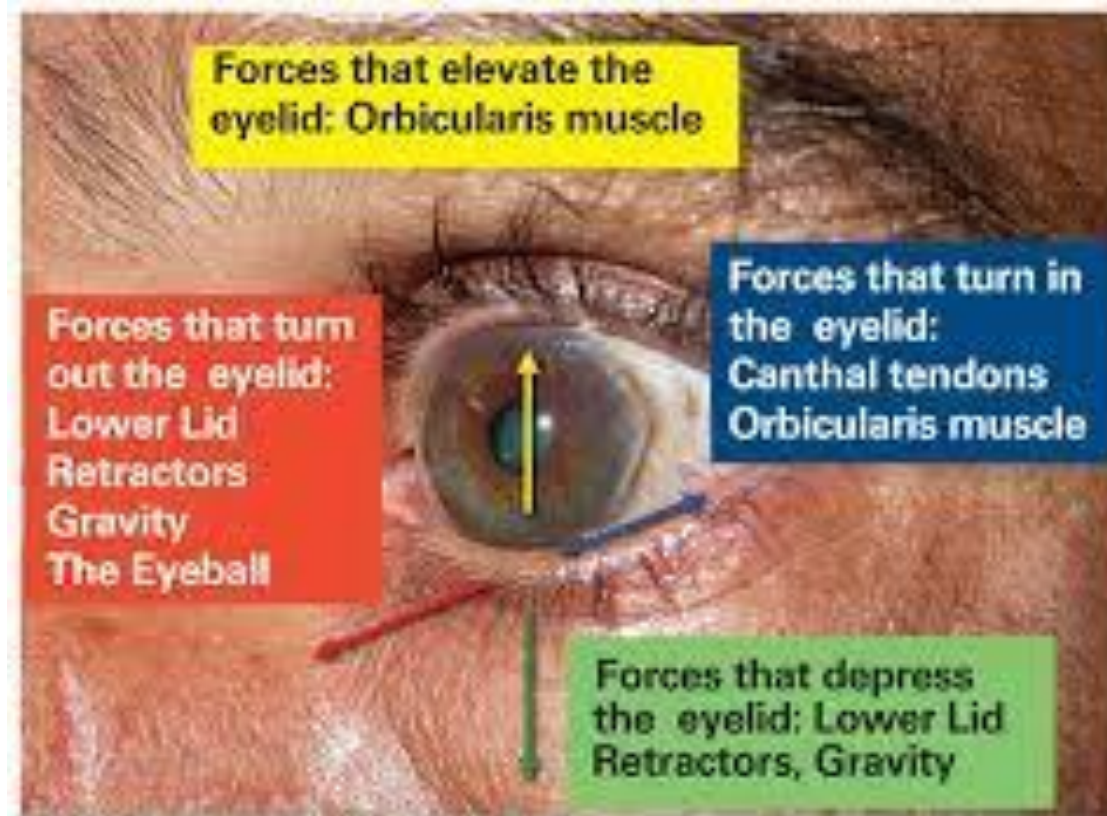
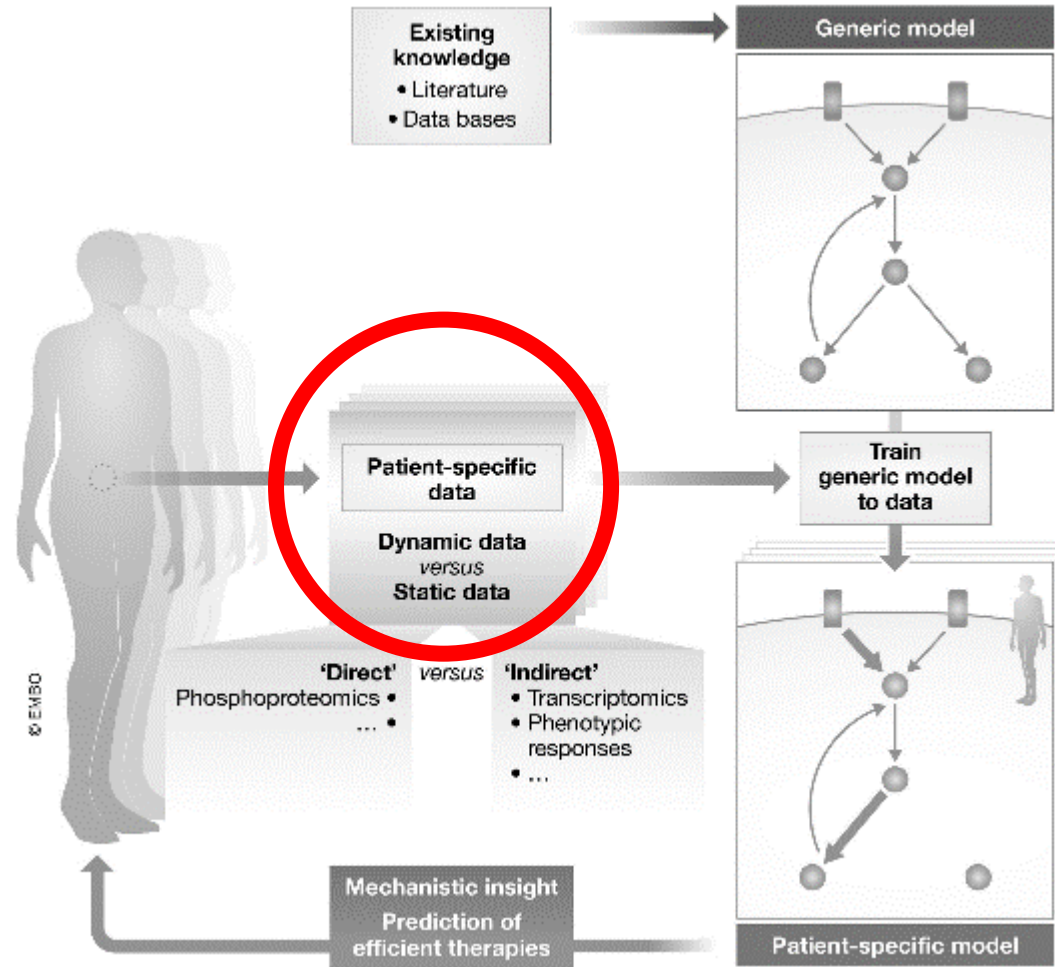


Figure 1. Forces acting on the lower eyelid to maintain normal position.

Patient Specific Model



Assessment → OBSERVATION

(1)brow position

(2)Blepharoptosis

(3)canthal tilt

(4)excess skin/deficiency

(5)excess subcutaneous tissue/deficiency

(6)periorbital skin rhytides

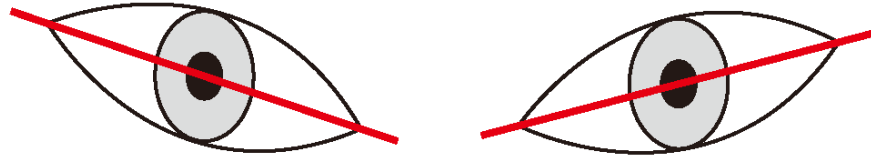
Skin Type

- FITZPATRICK SCALE
- RACE

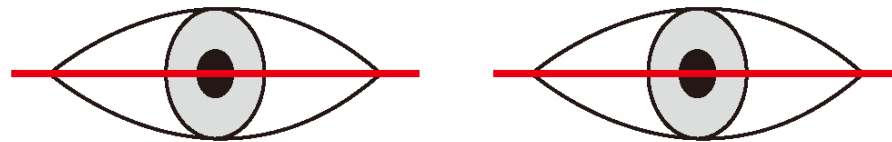
Score	Description	Female	Male
0-6	Pale white skin		
Type I	Extremely sensitive skin, always burns, never tans <i>Example: red hair with freckles</i>		
7-13	White skin		
Type II	Very sensitive skin, burns easily, tans minimally <i>Example: fair skinned, fair haired Caucasians, northern Asians</i>		
14-20	Light brown skin		
Type III	Sensitive skin, sometimes burns, slowly tans to light brown <i>Example: darker Caucasians, some Asians</i>		
21-27	Moderate brown skin		
Type IV	Mildly sensitive, burns minimally, always tans to moderate brown <i>Example: Mediterranean and Middle Eastern Caucasians, southern Asians</i>		
28-34	Dark brown skin		
Type V	Resistant skin, rarely burns, tans well <i>Example: some Hispanics, some Africans</i>		
35+	Deeply pigmented dark brown to black skin		
Type VI	Very resistant skin, never burns, deeply pigmented <i>Example: darker Africans, Indigenous Australians</i>		

Anthropometric measurements

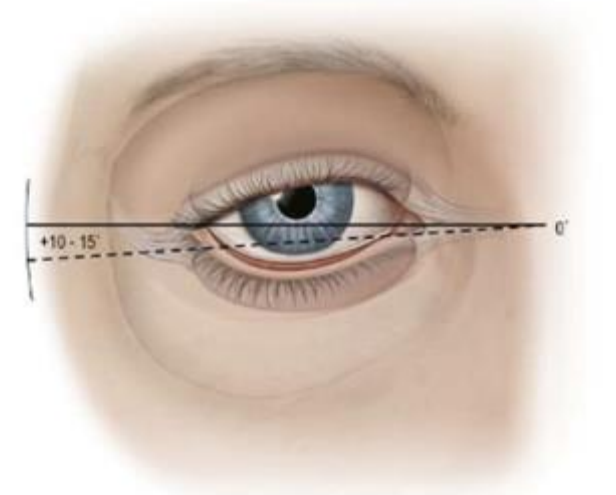
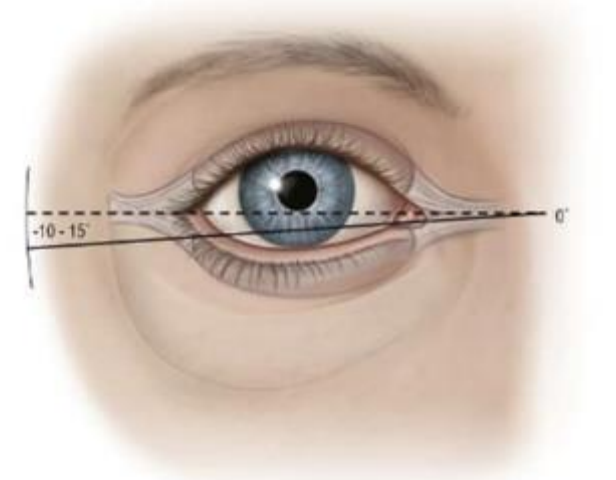
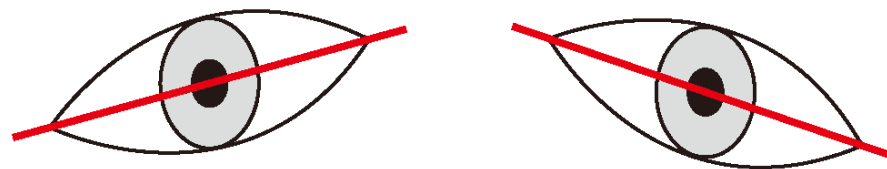
Class II
(Canthal tilt $>5^\circ$)



Class I
(Canthal tilt $\geq 0^\circ$ and $\leq 5^\circ$)



Class III
(Canthal tilt $<0^\circ$)



Skin Quality

Snap-Back and Pinch Tests Testing Generalized Laxity



- Pinch test
- Pull-back test



- Assessment of the internal palpebral ligament tone
- Assessment of the external palpebral ligament tone

Dynamic test

Forcible blinking or upgaze with an open mouth may reveal unexpected skin tension

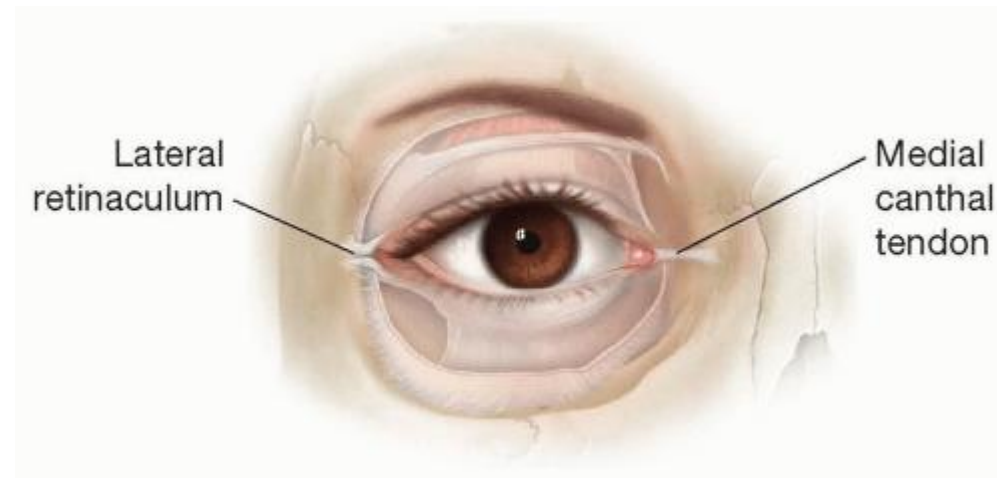
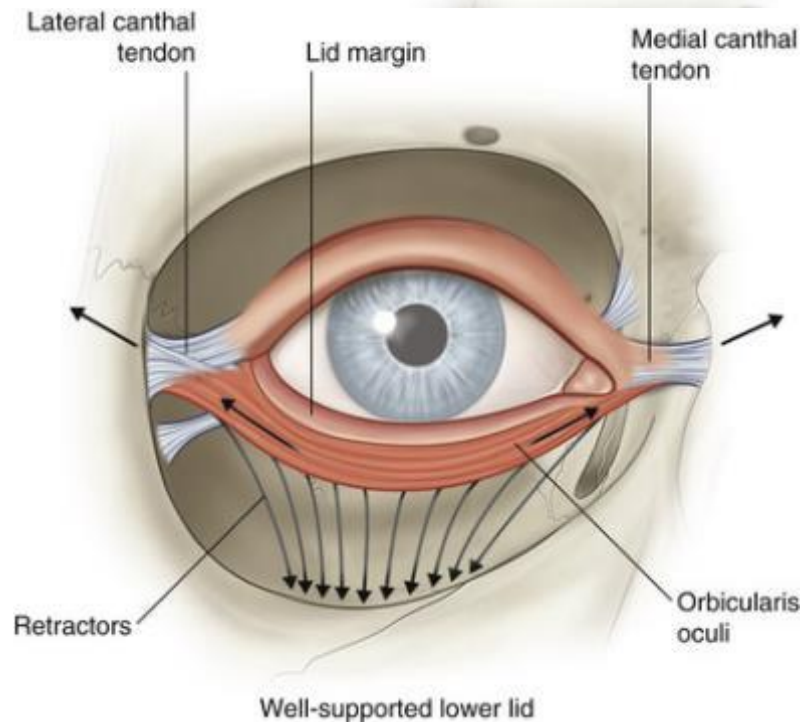
- Slit lamp biomicroscopy of the eyelid and ocular surface
- Syringing of the nasolacrimal system
- Facial nerve weakness – testing the orbicularis

Table 2. Tests for Assessment of Eyelid Laxity

Test	Grade 0 (normal)	Grade I	Grade II	Grade III	Grade IV (severe laxity)
Snap-back test	Returns to position immediately	~2-3 sec to return to position	~4-5 sec to return to position	>5 sec to return to position	Never returns to position, may continue to hang down
Medial canthal laxity test	0-1 mm displacement	~2 mm displacement	~3 mm displacement	>3 mm displacement	Does not return to baseline
Lateral canthal laxity test	0-2 mm displacement	2-4 mm displacement	4-6 mm displacement	>6 mm displacement	Does not return to baseline, even with blink

Anatomy → Canthopexy

Lower blepharoplasty or transpalpebral elevation of the middle third



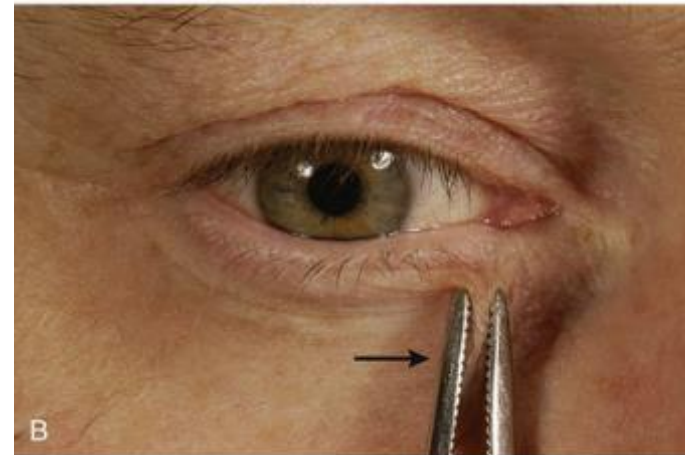
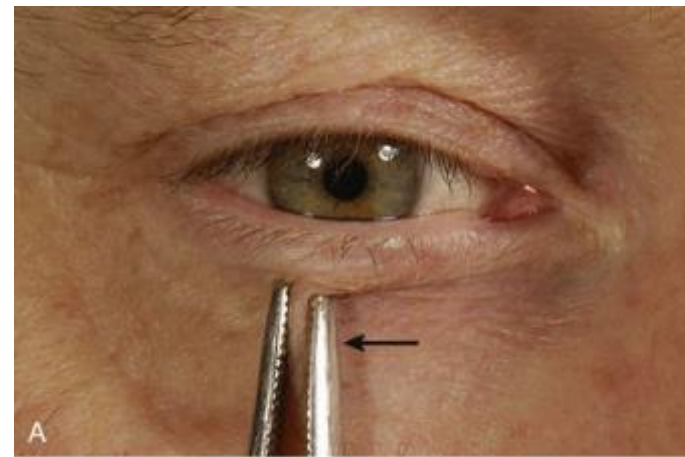
- Tarsal laxity (snap test positive).
- Lagophthalmos
- Canthal dystopia
- Ectropion
- Loss of substance of the lower eyelid.

Biomechanics:
The Suspension Bridge

Fagien S. **Algorithm for canthoplasty: the lateral retinacular suspension: a simplified suture canthopexy.** Plast Reconstr Surg. 1999;103(7):2042-53.

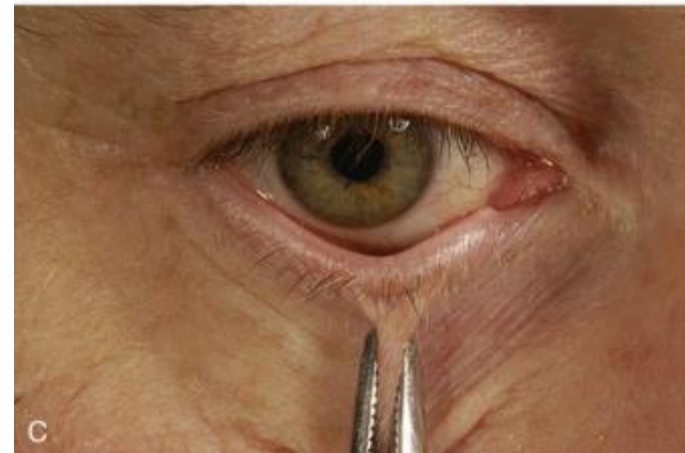
Medial distraction test

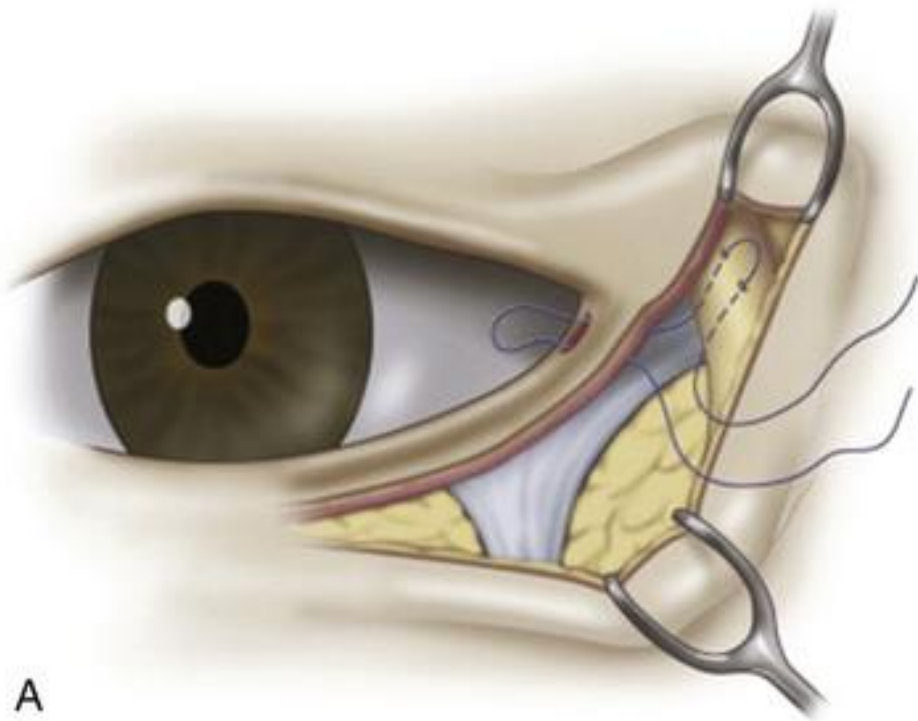
A “lax” MCT = punctum moves 1 to 3mm
(if the punctum past the medial limbus→QX)



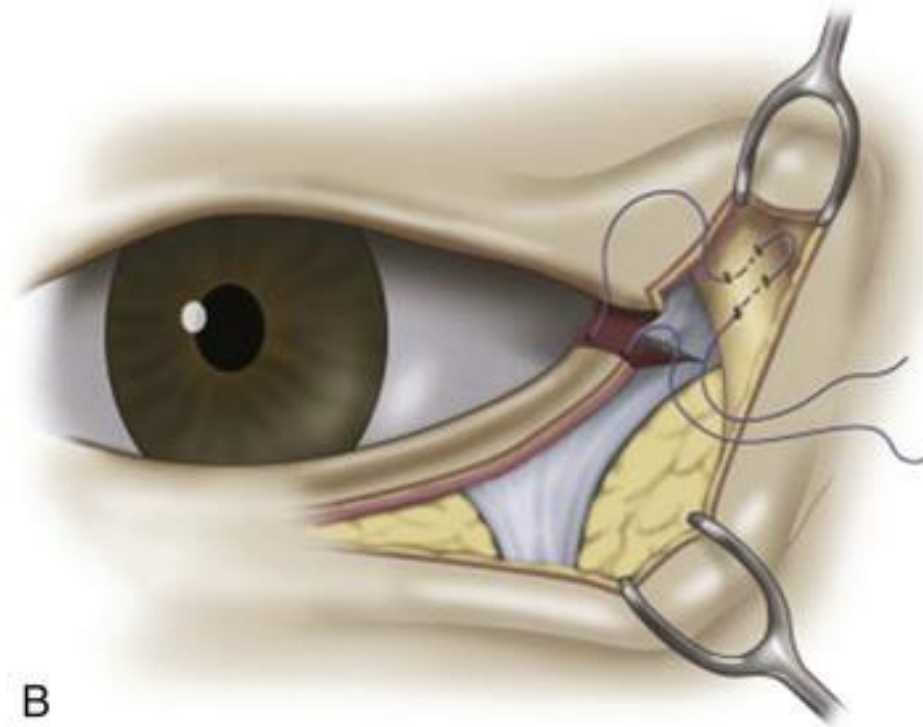
Lateral Distraction Test

Up to 2 mm of movement is normal





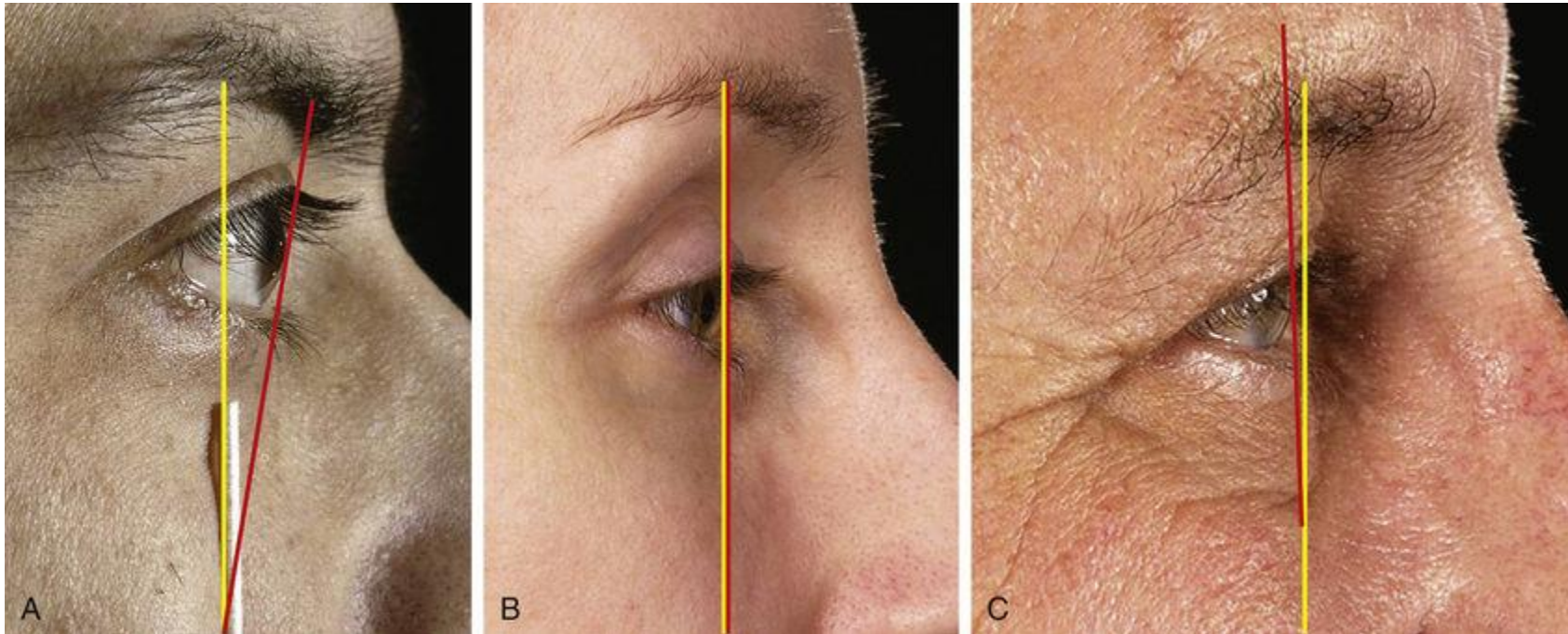
A



B

canthopexy (A) and canthoplasty (B).

Horizontal Laxity in A Patient with the Negative Orbital Vectors.



Orbital Vectors

Horizontal Laxity in A Patient with the Negative Orbital Vectors.

Diminishes the hollowed appearance of the orbit

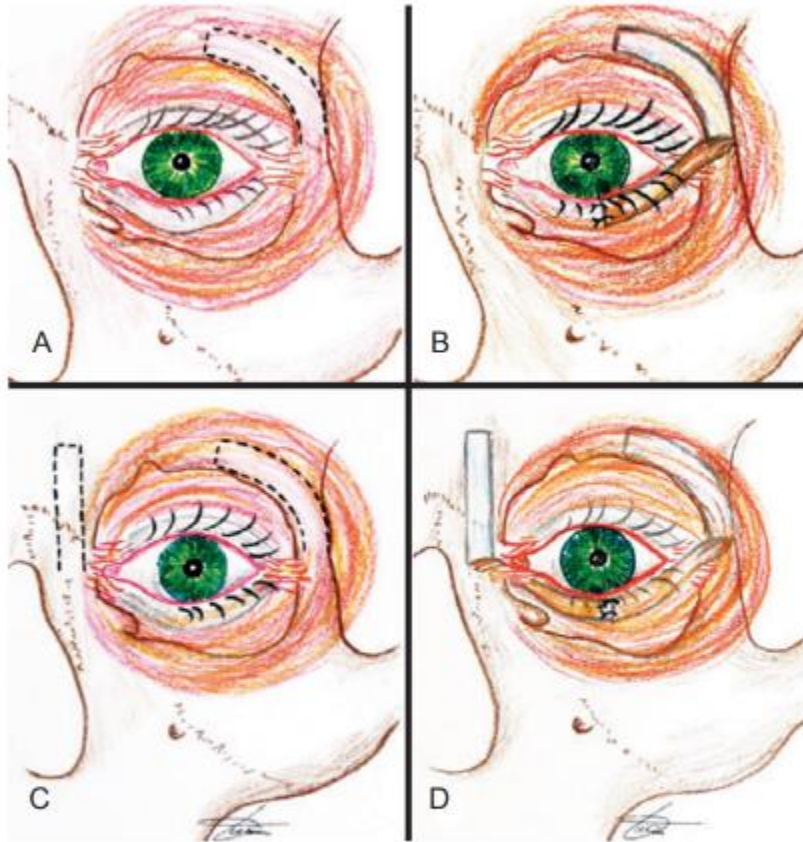
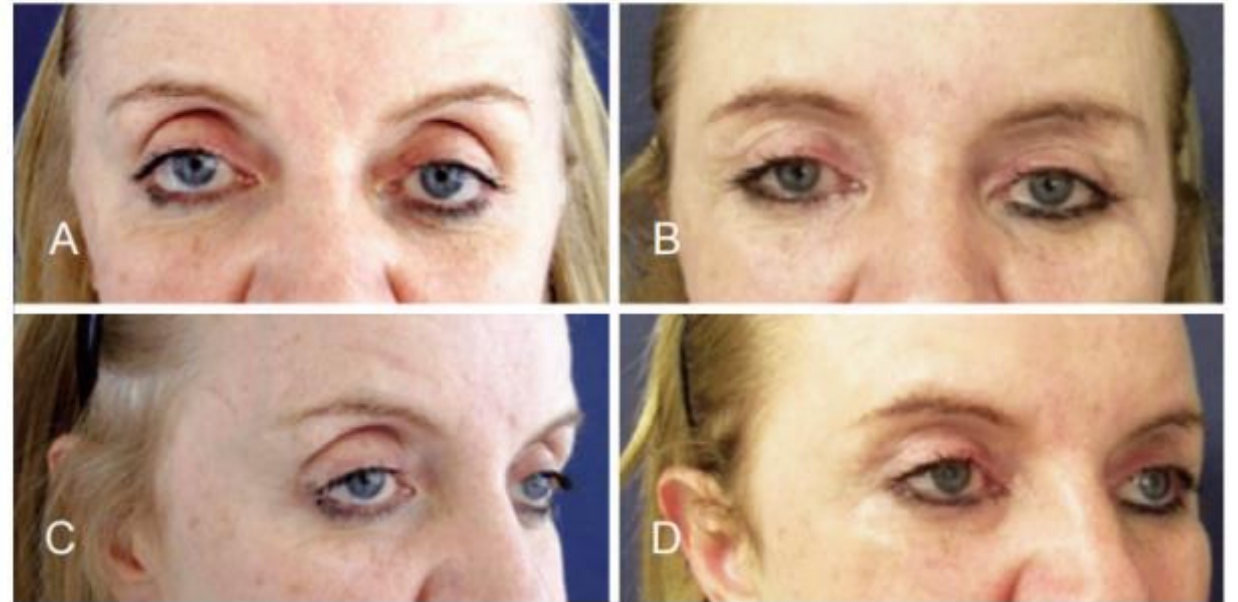
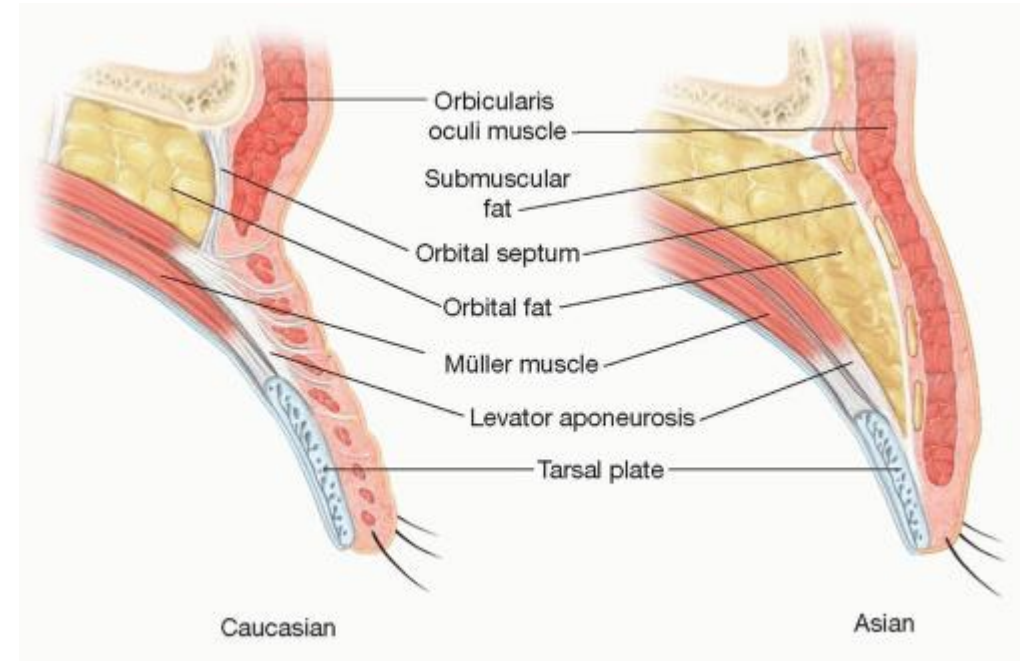
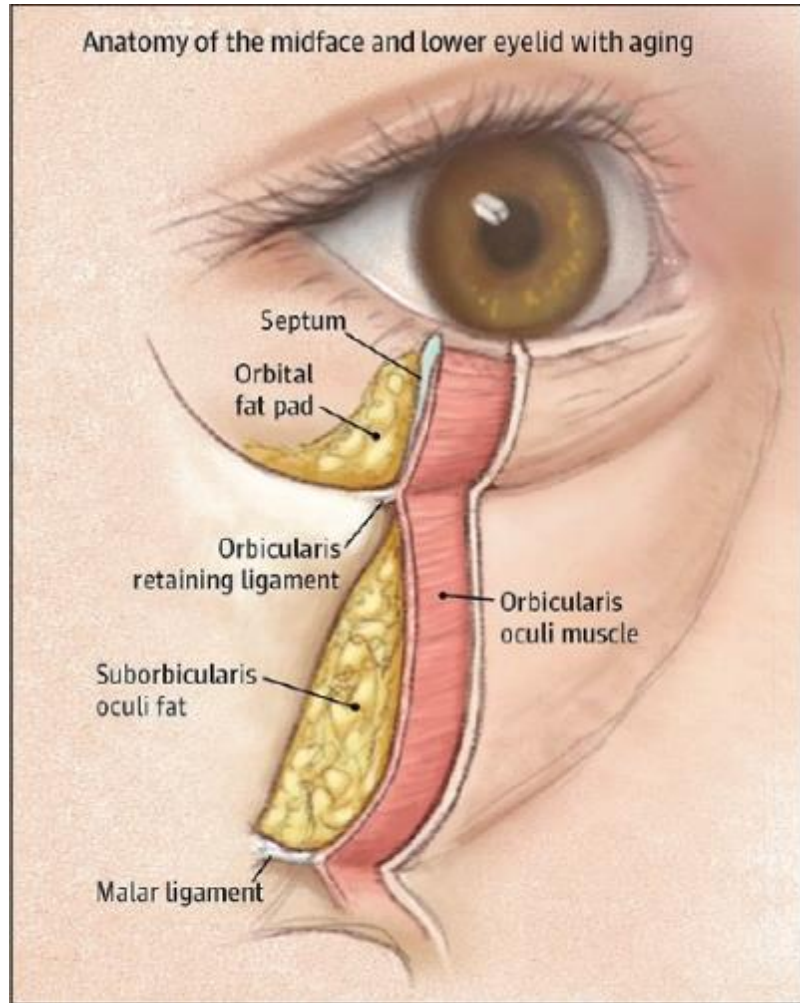


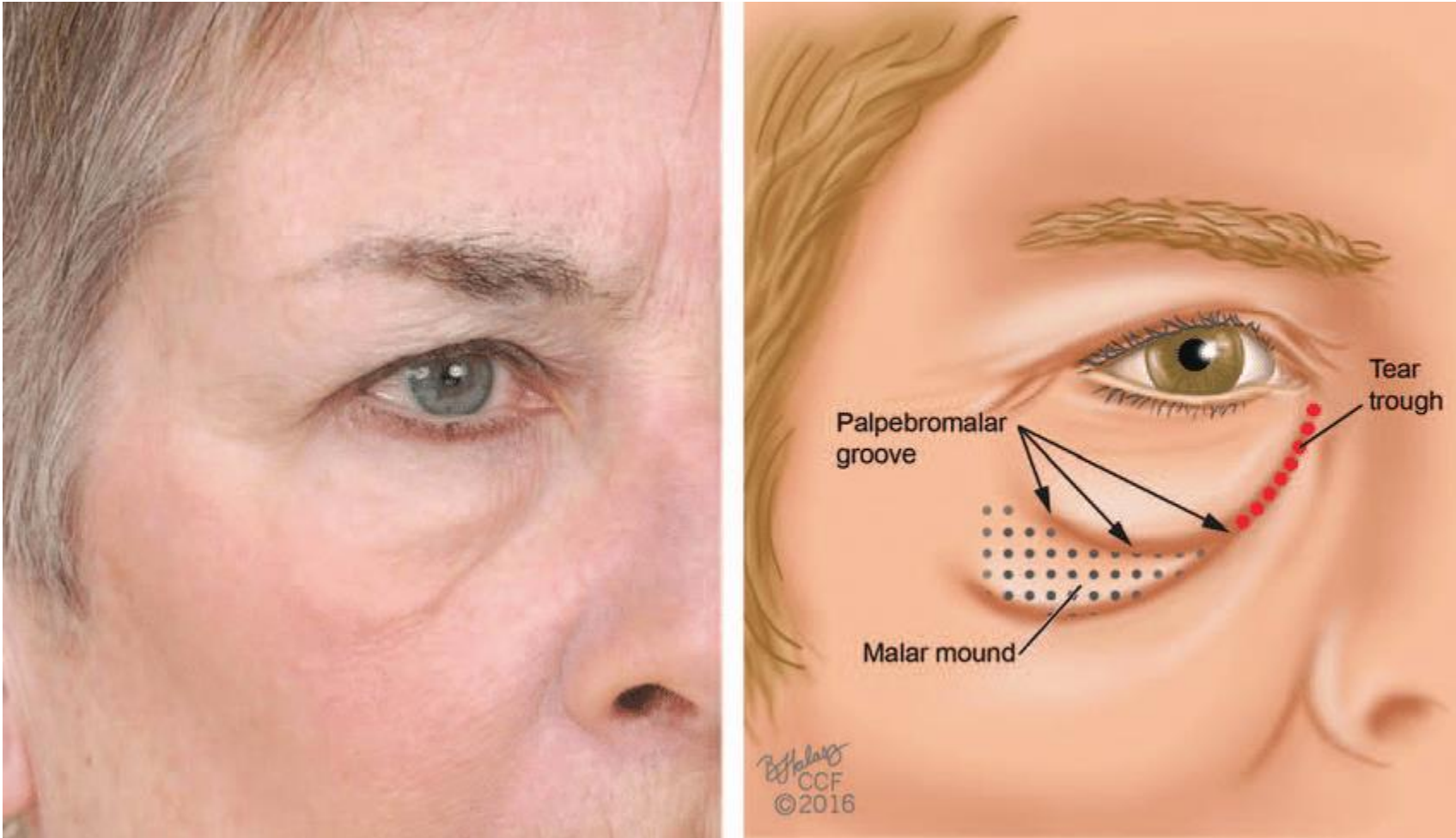
Figure 1 – Illustration of the surgical technique. In **A**, demarcation of the periosteal flap on the inner side of the orbit; In **B**, the positioned flap; In **C**, demarcation of the medial and lateral periosteal flaps; In **D**, positioned flaps (eyelid suspension “on clothesline” technique).

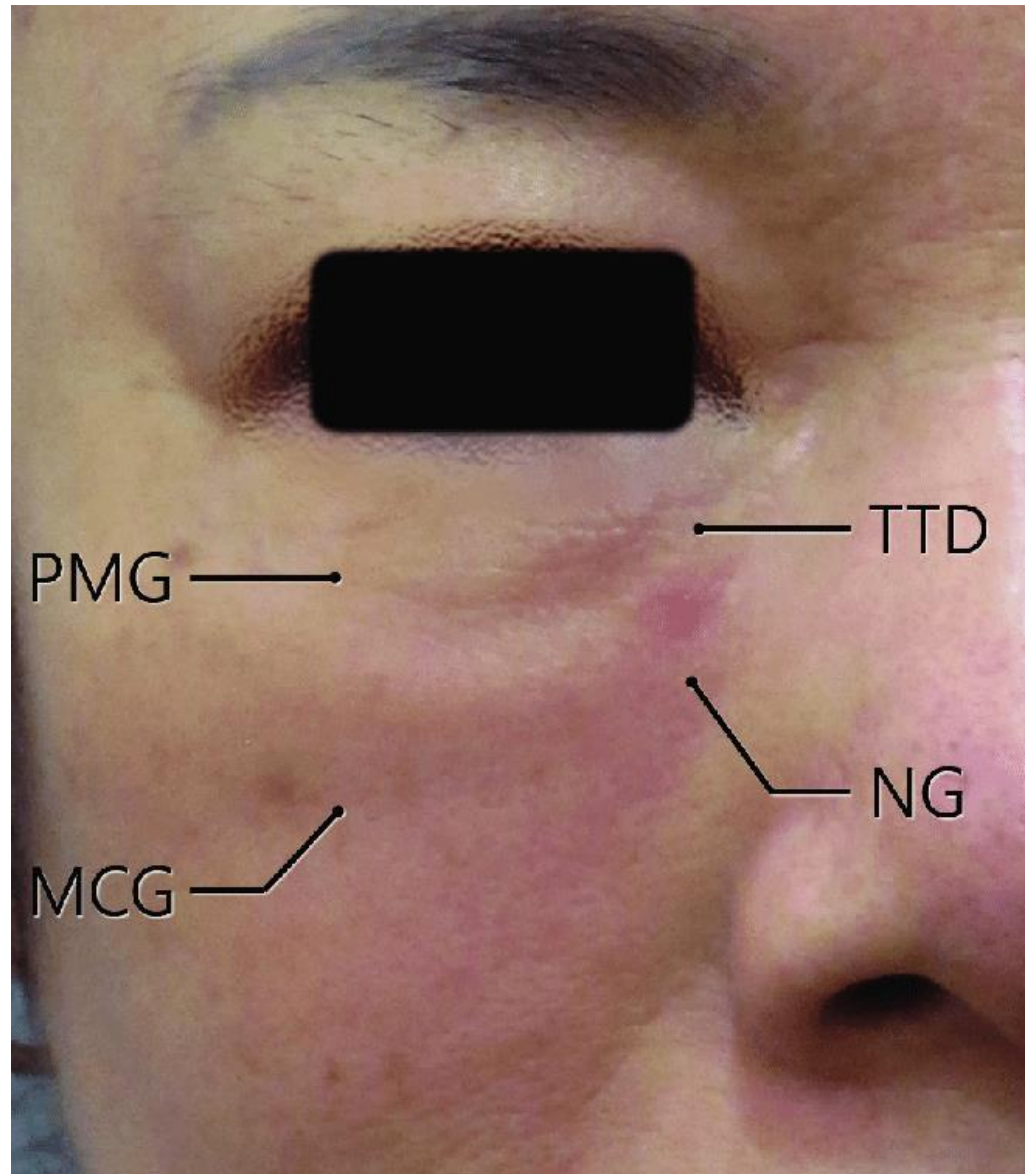


Subcutaneous Tissue



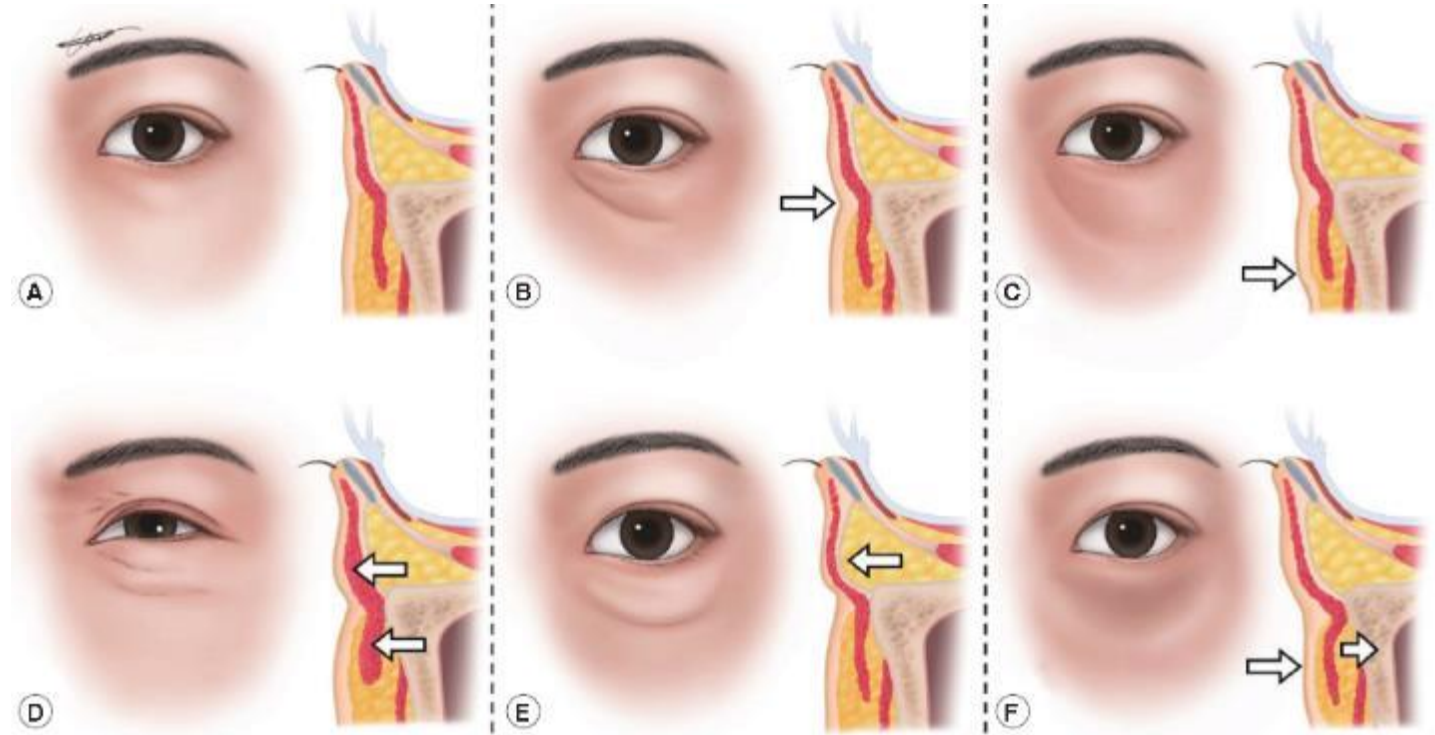
Combined assessment (Skin + Subcutaneous Tissue)

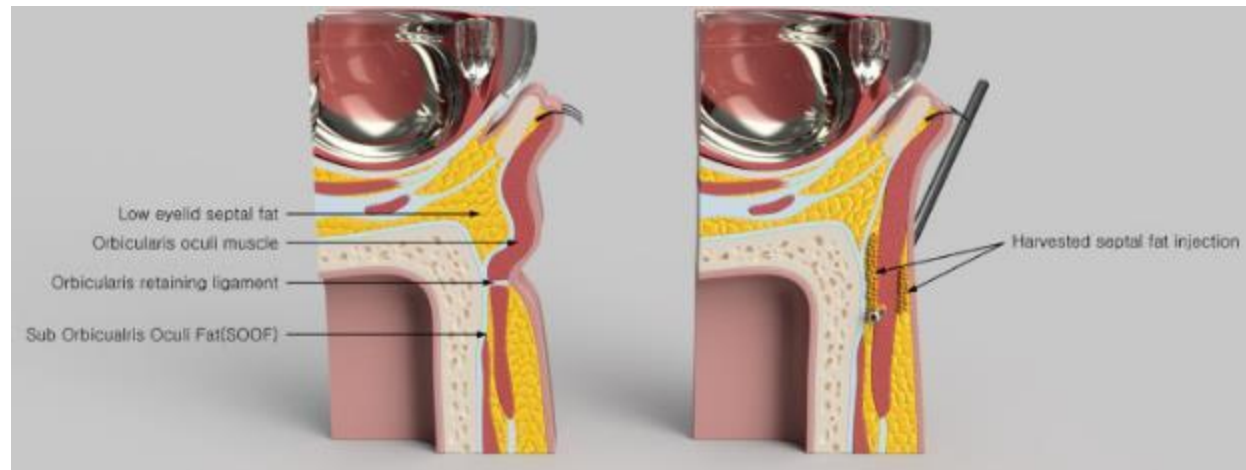




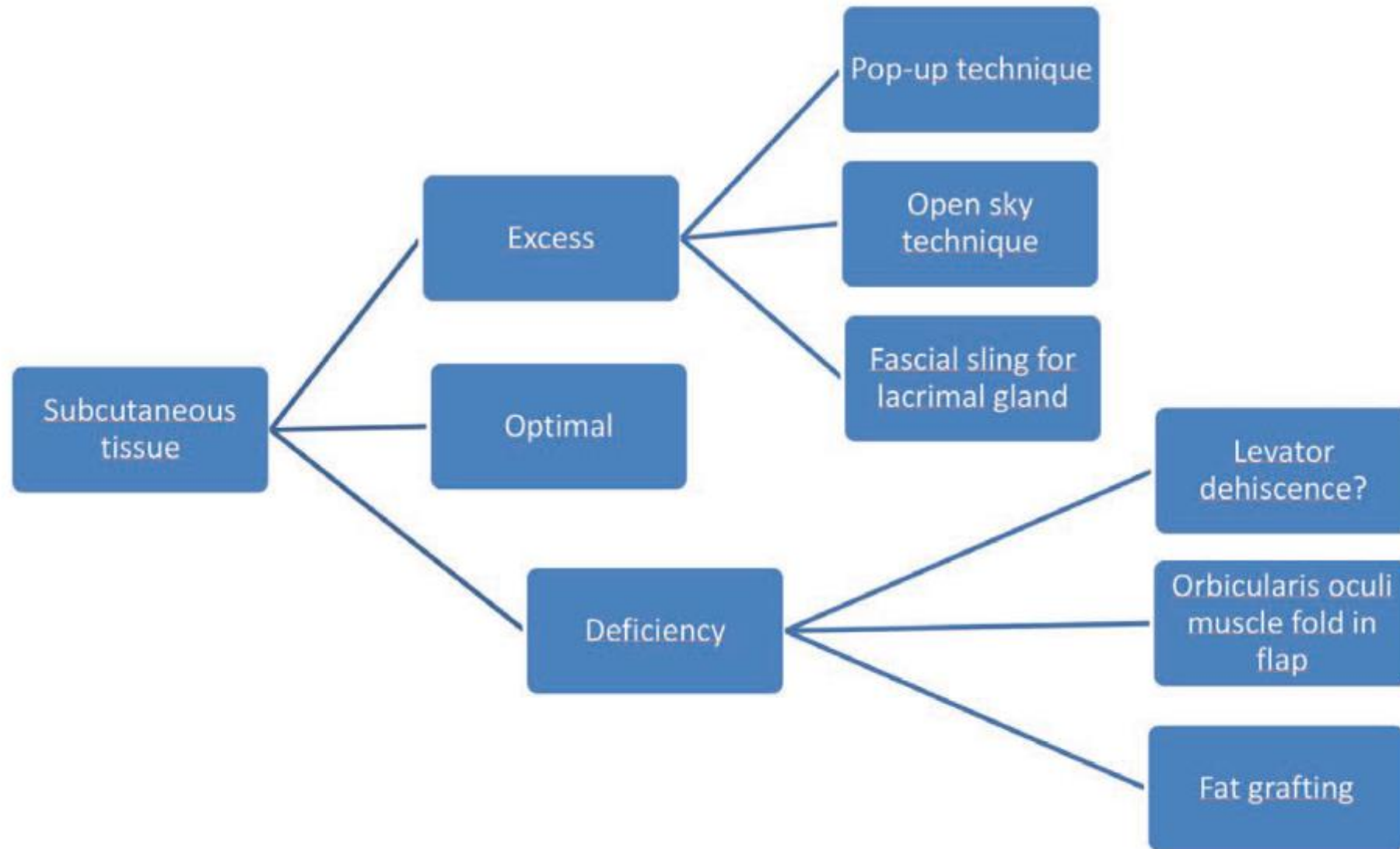
- Palpebromalar Groove
- Mid-Cheek Groove
- Tear Trough Deformity
- Nasojugal groove

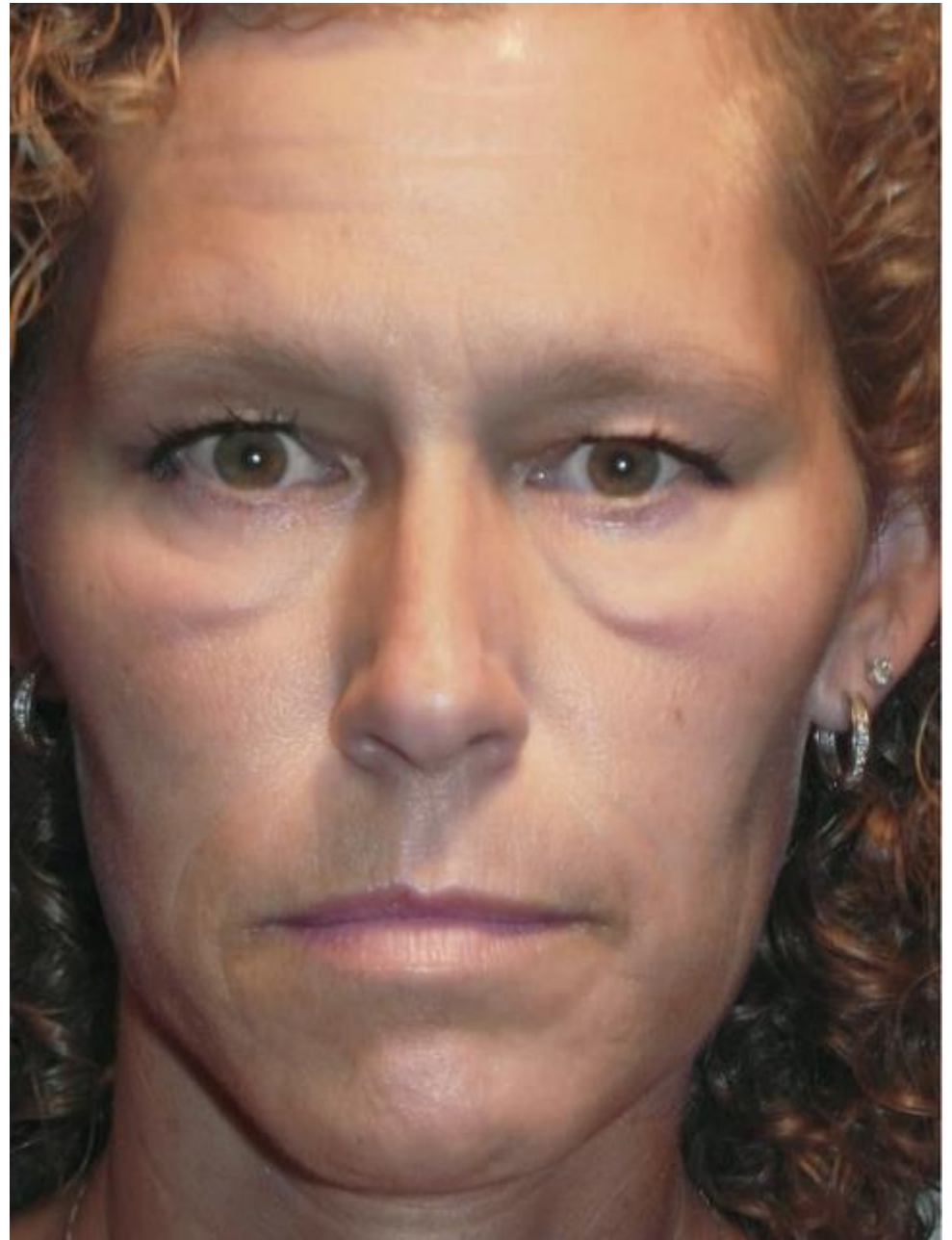
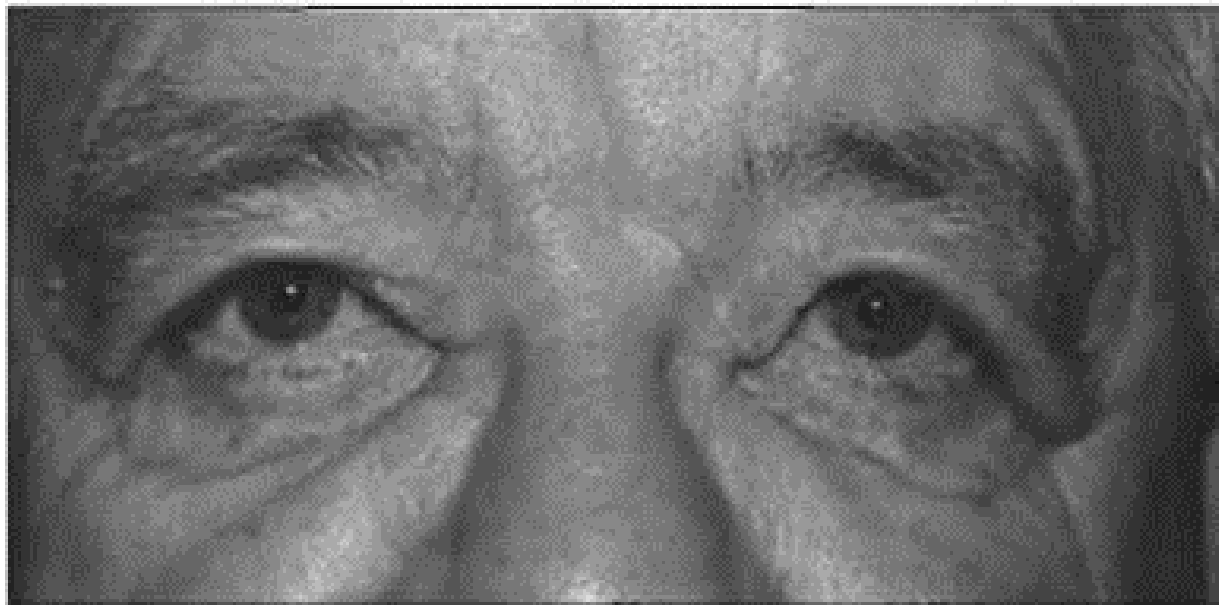
- A. Normal
- B. Tear Trough Deformity (atrophy skin and Fat)
- C. Nasojugal groove.
- D. TTD due to contraction of orbital part of OOM (squinting)
- E. TTD due to herniation of infraorbital fat.
- F. Infraorbital hollowness through malar bone resorption + skin atrophy



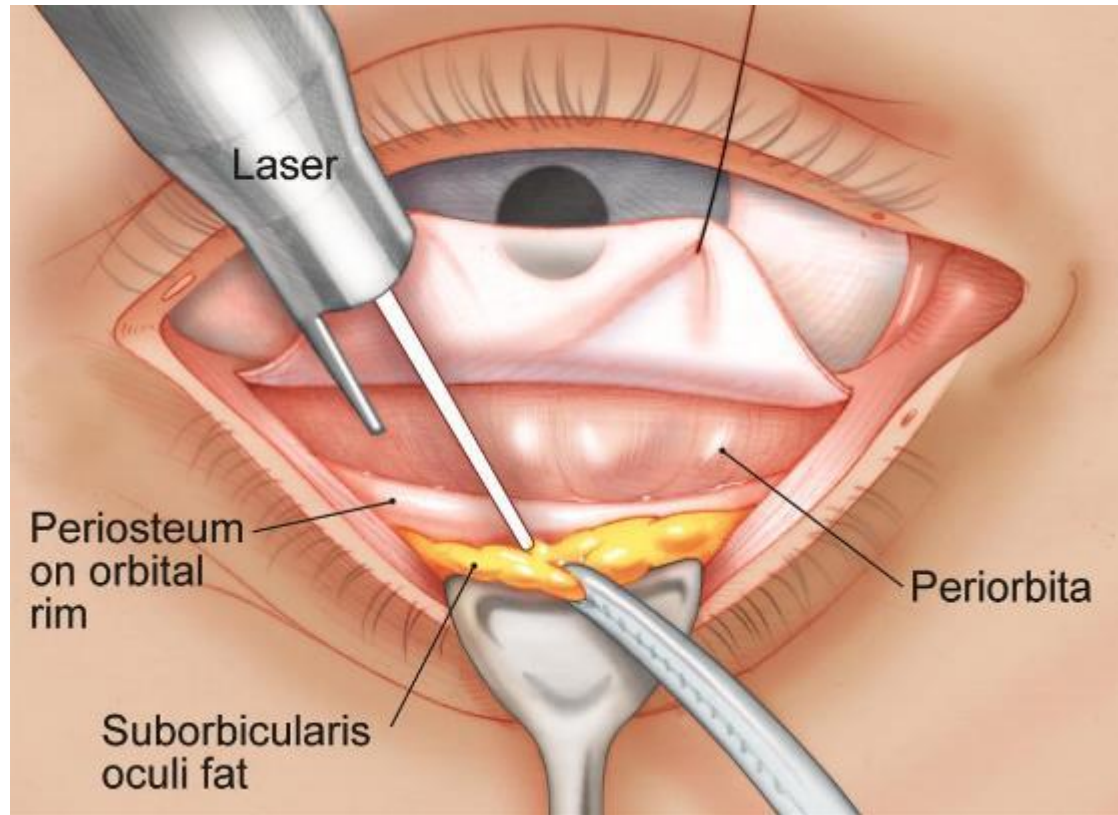


Lee, Won Cho, Jin-Kwon Koh, Ik-Soo Kim, Hyung Moon, Yang, Eun-Jung. **Infraorbital groove correction by microfat injection after lower blepharoplasty.** Journal of Plastic, Reconstructive & Aesthetic Surgery; Volume 73, ISSUE 4, P777-782, April 01, 2020. <https://doi.org/10.1016/j.bjps.2019.11.016>.

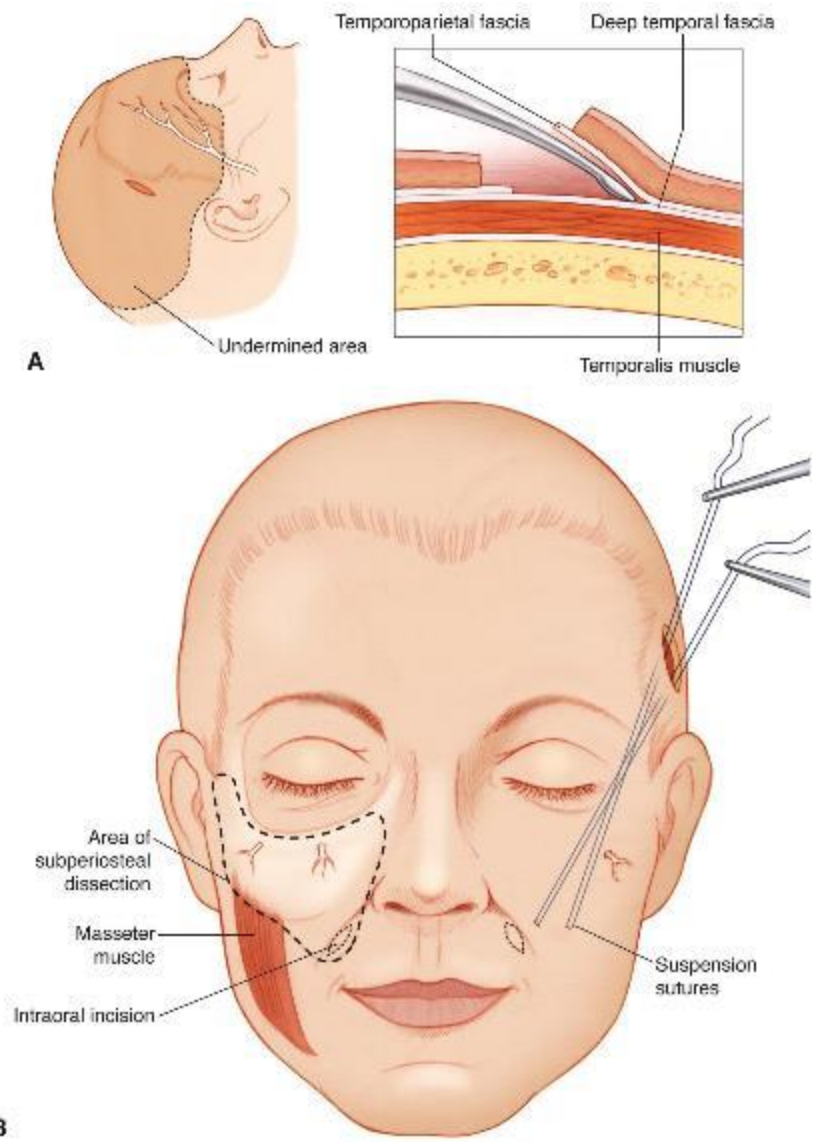




Subperiosteal lift of middle face or Sclerotic Tx



SOOF lift







Richard's procedure for
partial inferior Eyelid
Skin-Muscle flap

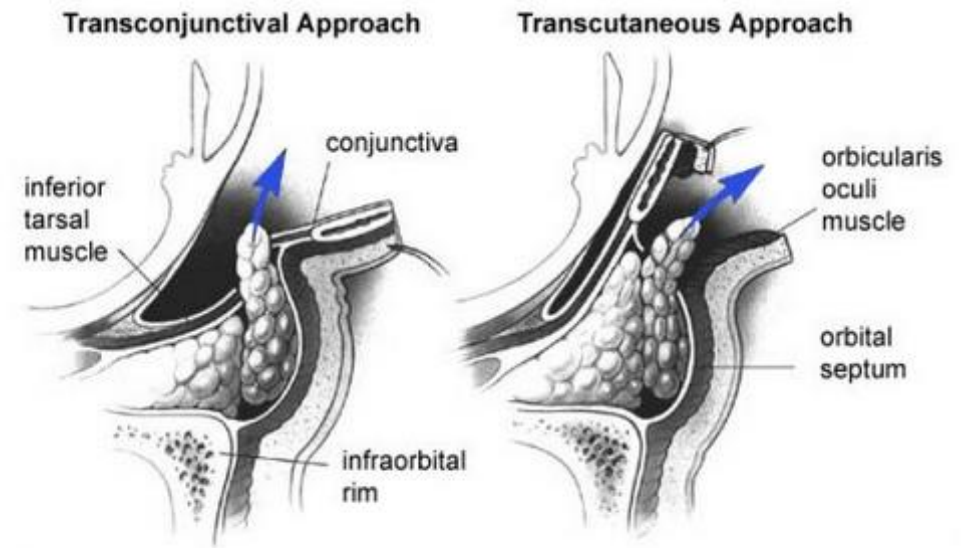
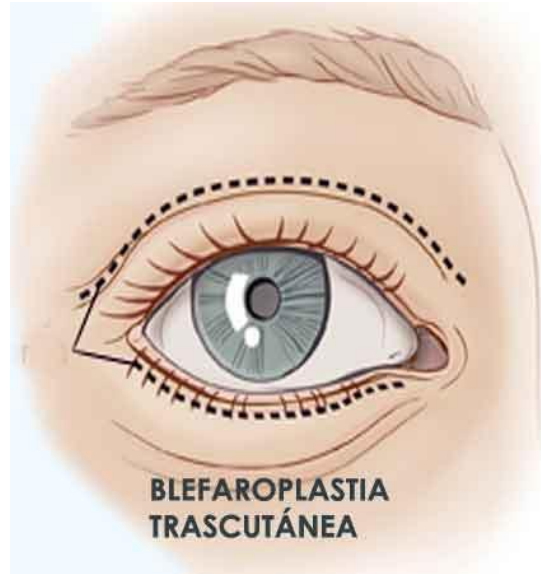


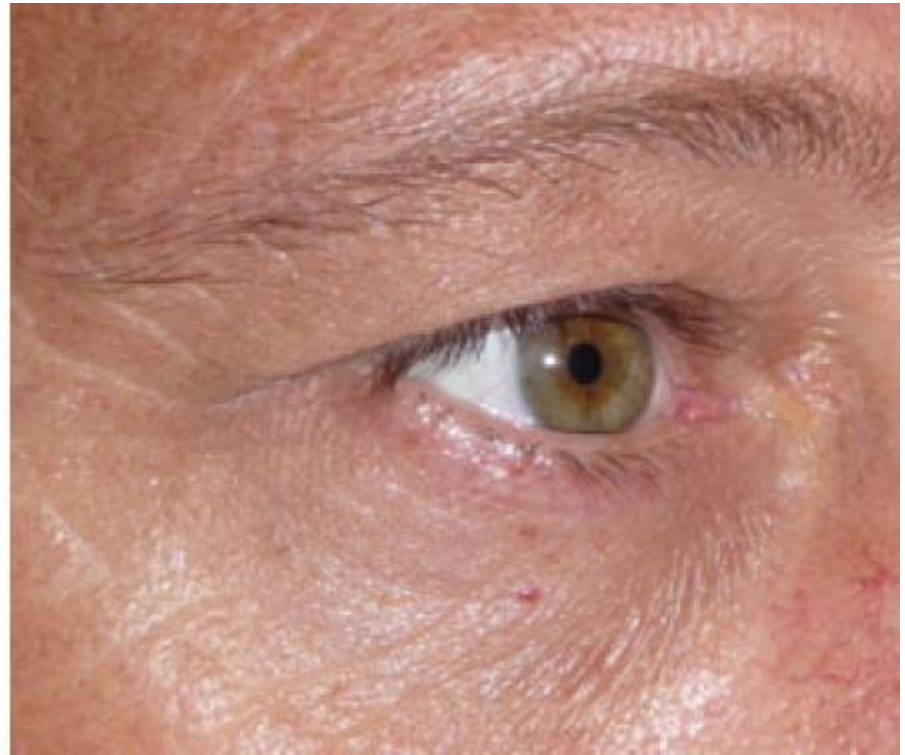
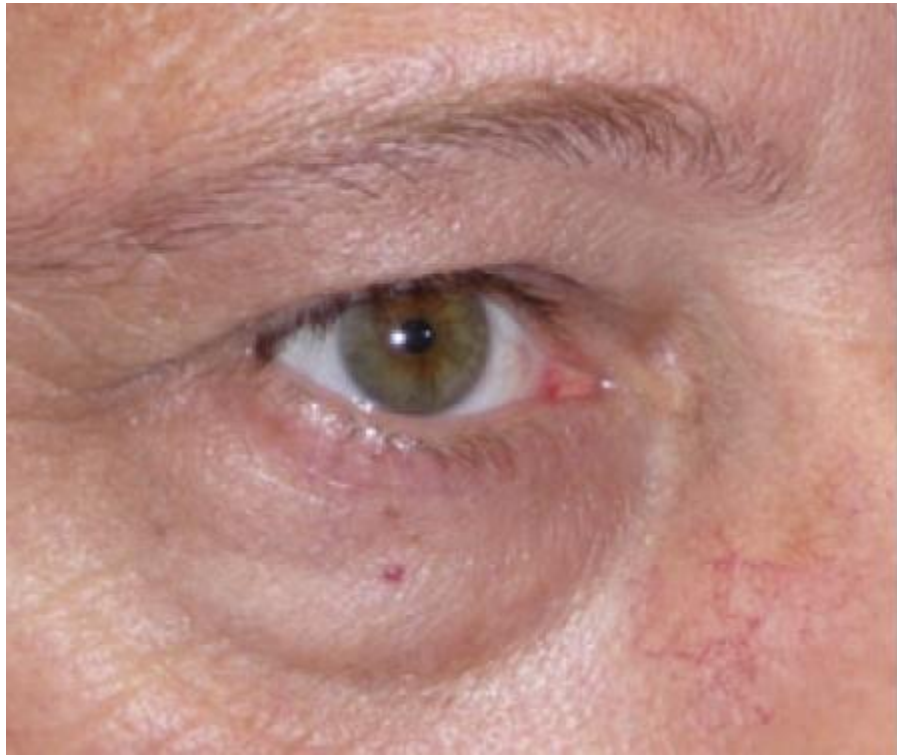
Classification of lower eyelid deformity

Type I	Type II	Type III	Type IV
			
Volume deficiency	Volume deficiency	Volume deficiency	Volume deficiency
Eye bag(or mild)	Eye bag	Eye bag	Eye bag
Skin laxity	Skin laxity	Skin laxity	Skin laxity
1 treatment	2 treatment	3 treatment	Festoon treatment
1. Fat graft only	1. Fat graft 2. Transconjunctival eye bag removal	1. Fat graft 2. Transconjunctival eye bag removal 3. Pinch skin excision	1. Fat graft 2. Pinch skin excision

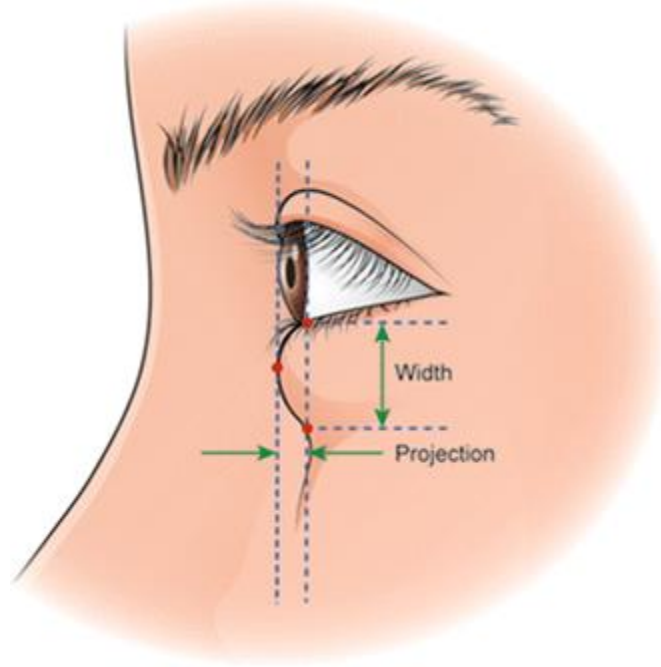
Mao, SH., Chen, CF., Yen, CI. et al. A Combination of Three-Step Lower Blepharoplasty to Correct Four Types of Lower Eyelid Deformities in Asian People. Aesth Plast Surg 46, 1224–1236 (2022). <https://doi.org/10.1007/s00266-021-02643-3>



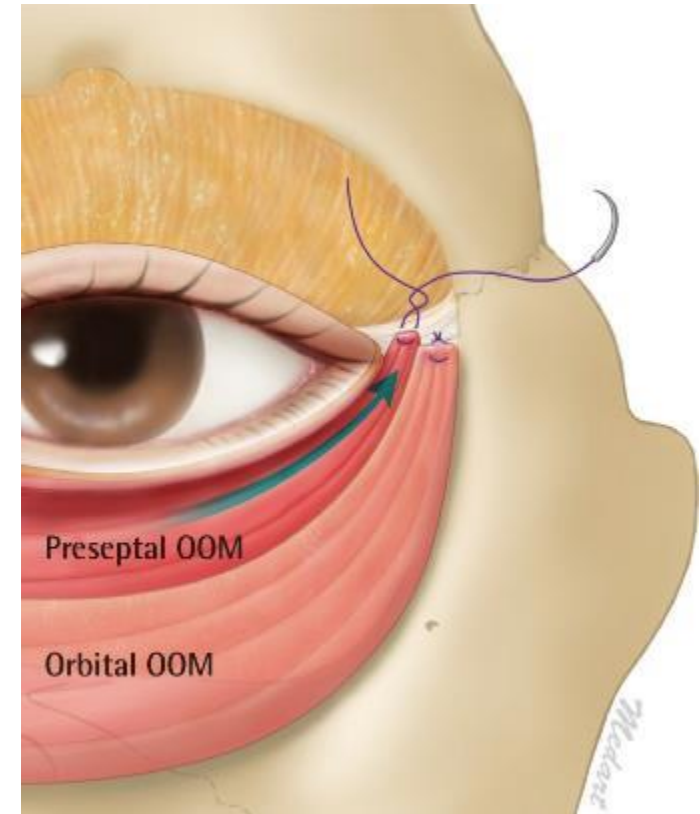
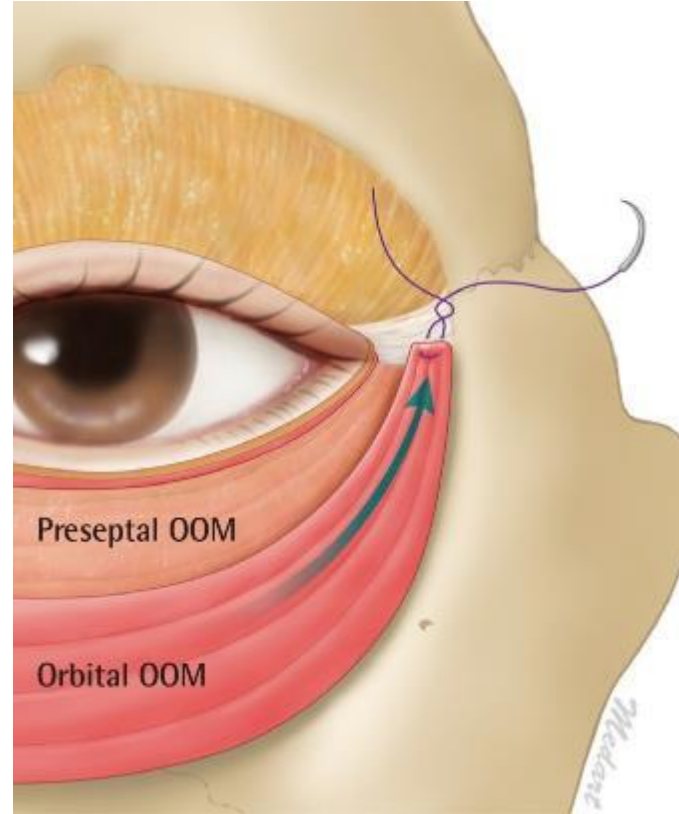
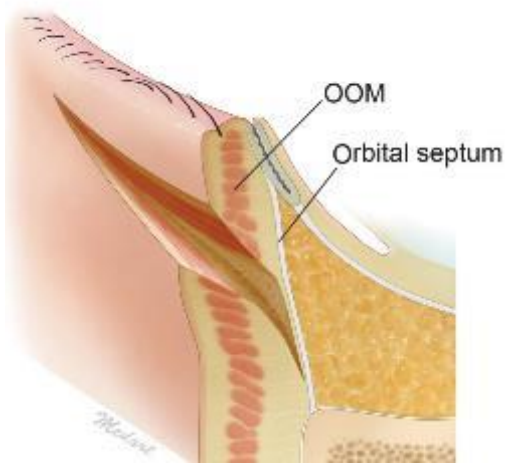




Pretarsal fullness (Asia)



Methods for forming the pretarsal fullness (Asia)

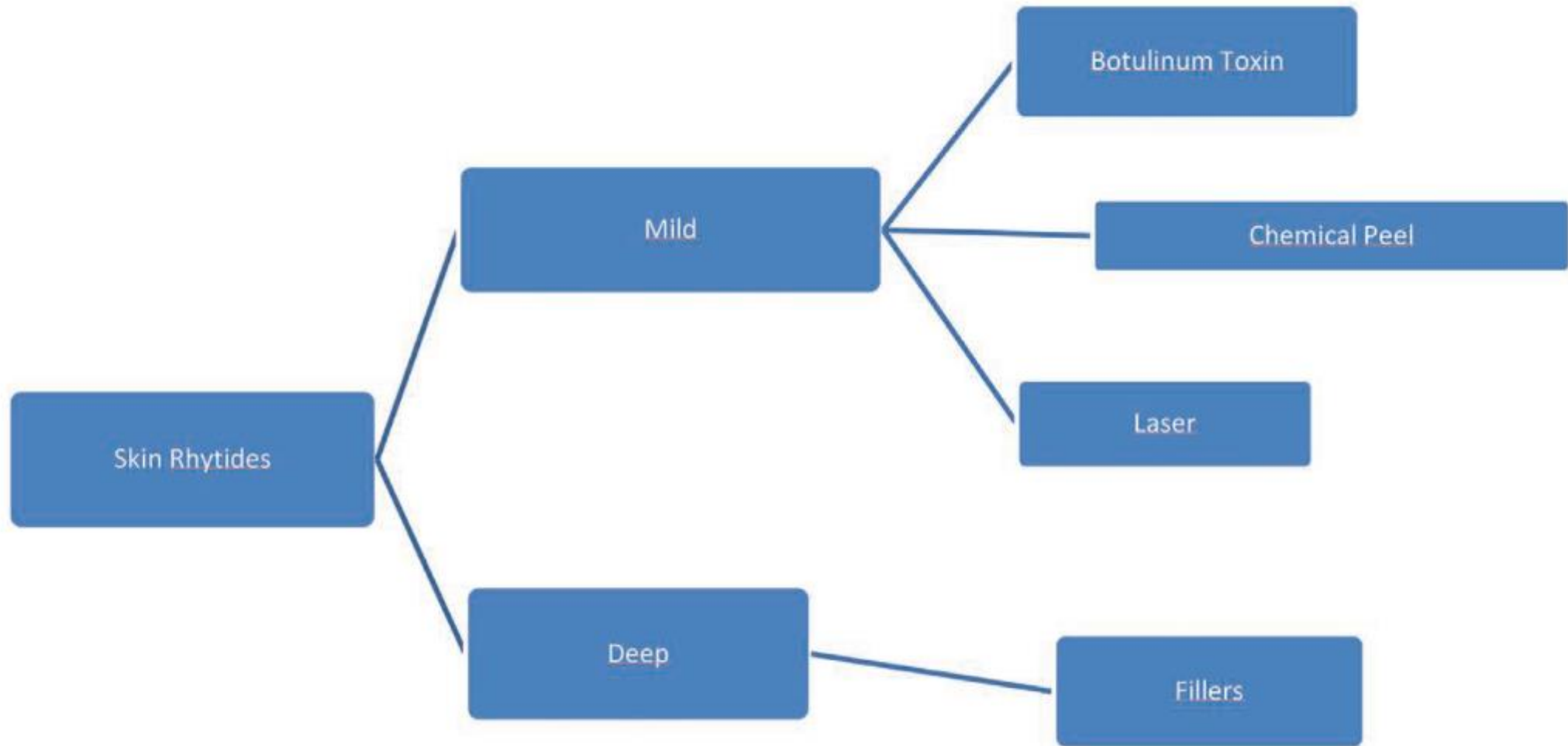


pretarsal and preseptal portions of the OOM

- Less scarring granulomas
- No bulky and irregular pretarsal fullness that can result from unnecessary suturing of the muscle on both sides

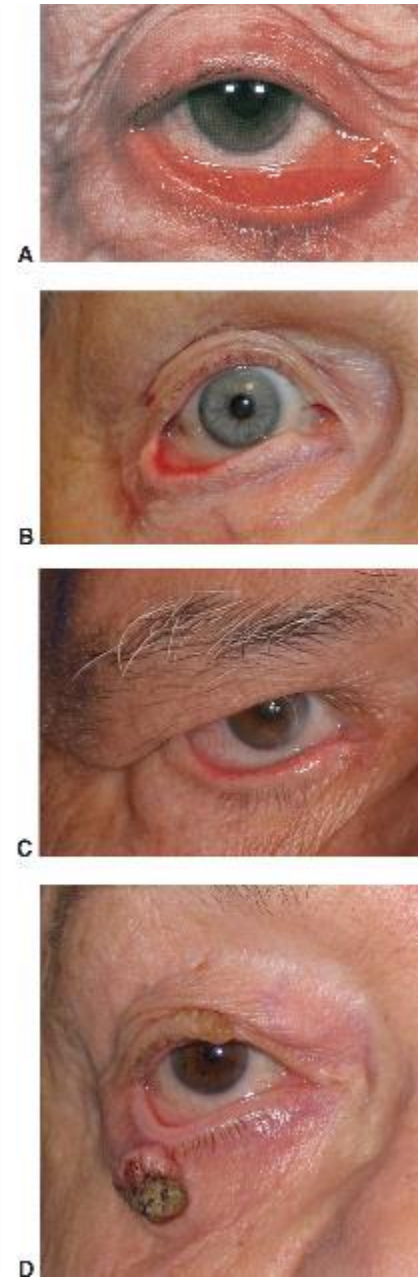
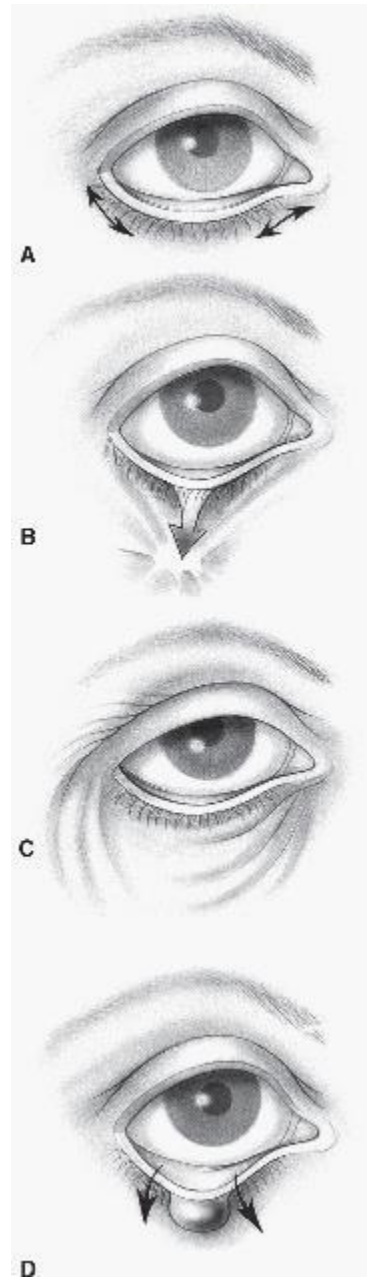
Shin, Jae Hoon; Chung, Chan Min; Hong, In Pyo; Lee, Hyung Joo; Baek, Ji Eun. A New Method for Forming the Pretarsal Fullness after Lower Blepharoplasty. Arch Plast Surg. 2014;41(6):790-792. Published online November 3, 2014. DOI: <https://doi.org/10.5999/aps.2014.41.6.790>

- **Skin Flap**
- **Transcunjunctival approach**
- **Skin-Muscle flap**

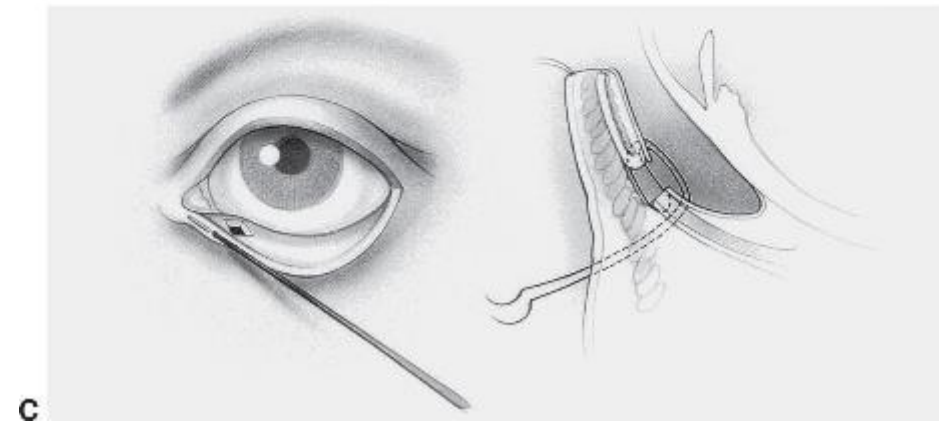
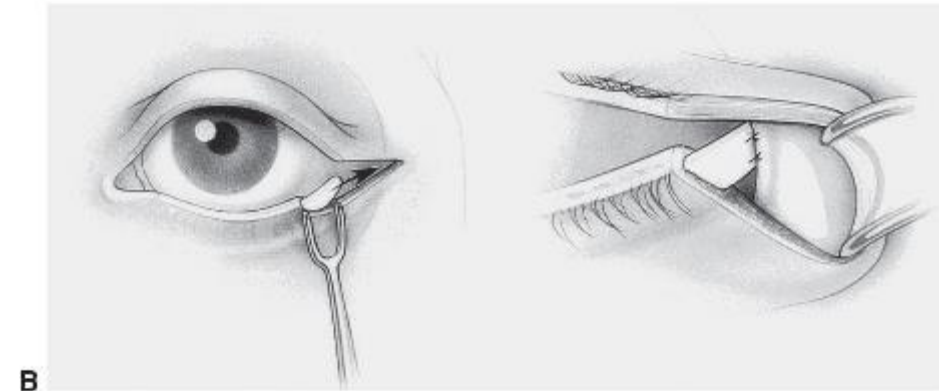
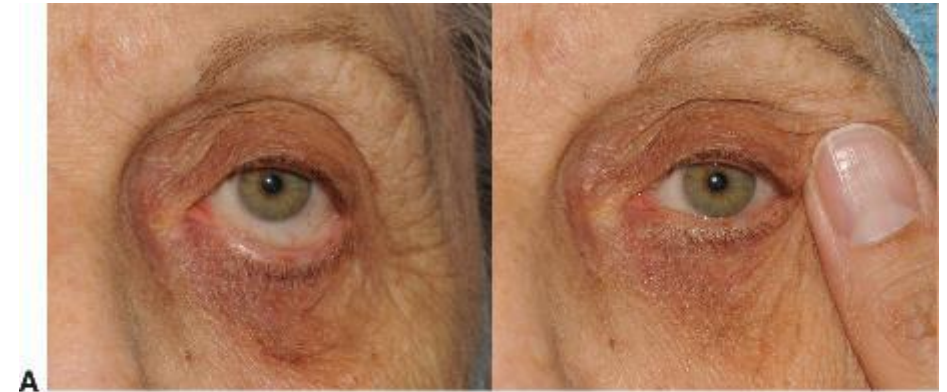


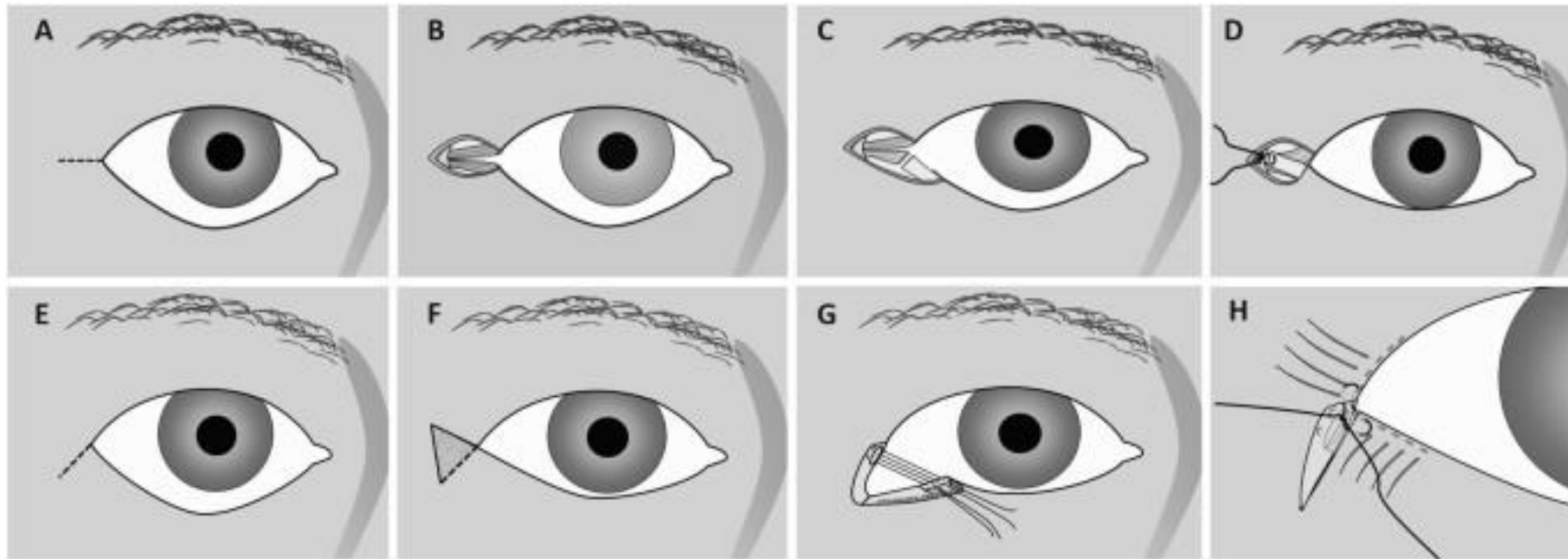
Types of ectropion

- A. congenital
- B. involutional
- C. cicatricial
- D. paralytic
- E. mechanical



- A. Lateral stretching of the eyelid demonstrates the potential of lower eyelid tightening.
- B. Lateral tarsal strip procedure: anchoring the tarsal strip to periosteum inside the lateral orbital rim.
- C. Medial spindle procedure: outline of excision of conjunctiva and retractors.





Vahdani, K., Ford, R., Garrott, H. *et al.* **Lateral tarsal strip versus Bick's procedure in correction of eyelid malposition.** *Eye* **32**, 1117–1122 (2018). <https://doi.org/10.1038/s41433-018-0048-9>

Evaluation Workflow

- Patient Problem
- Skin
- Symmetry
- Possibilities → Drawing



Thank You