

# Rhytidectomy: Facial Surgical Anatomy

# Overview

- Dissection Course
- Anatomy

# Dissection Course

- April 29<sup>th</sup>
- Unfortunately, starting with sinus surgery
- Facial plastics 4-7 PM
- Staffed by Rawnsley, Keller and Reilly
- Brief lecture to start
- Dissections

# Dissection Course

- Objectives: Rhinoplasty
  - Closed rhino incisions
    - Intercartilaginous
    - Transcartilaginous
  - Open Rhinoplasty
    - Cephalic trim
    - Lateralize upper lats
    - Take down the dorsum
    - Medial and lateral osteotomies



# Dissection Course

- Facelift: Skin and SMAS dissection
  - Subcutaneous flap elevation
  - Raise SMAS flap
  - Identify Zygomaticus
- Browlift
  - Coronal approach
  - Identify different planes of dissection
  - Identify Corrugator, supraorbital and supratrochlear nerves

# Patterns of Aging



# Problems of Aging

- Loss of facial soft tissue volume
  - Midface hollowing
  - Temporal atrophy
  - Periorbital atrophy
  - Muscular volume loss
- Gravity induced descent
- Dynamic facial rhytid creation
  - Agonists and antagonists

# Pathophysiology of the Aging Face

- Facial aging characteristics
  - Gravitational migration of tissues
    - Skin
    - Subcutaneous fat
    - Superficial fascia
  - Increasing prominence of NLFs
  - Downward-drooping jowls
  - Laxity of submental and anterior neck tissues



# Pathophysiology of the Aging Face

- Vectors of tissue migration
  - Cheek and lower face
    - Platysma suspended by the SMAS
    - Both elongate with aging
    - Platysma, SQ fat, and skin descend vertically
  - Produces jowls and laxity in the submental and anterior neck regions
  - 5 fat collections (Hoefflin, 1998)
    - Malar
    - Nasolabial
    - Jowl
    - Buccal
    - Submental



# Pathophysiology of the Aging Face

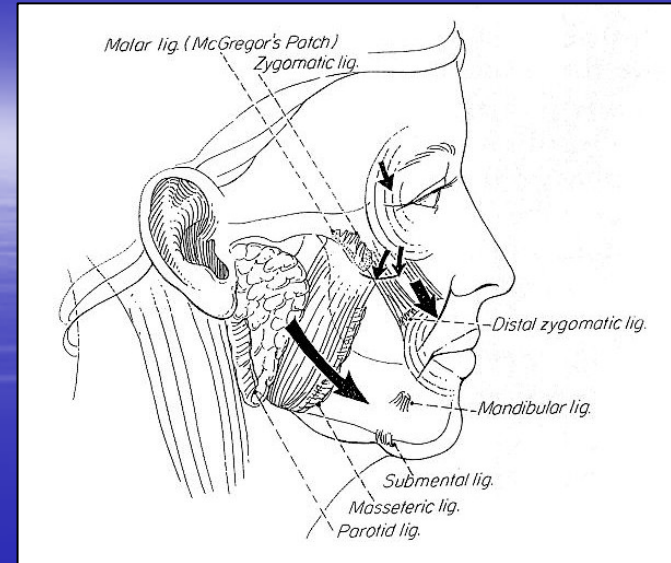
- Midface
  - SMAS invests the lip levator muscles
  - Overlying malar fat pad slides vertically superficial to the SMAS
  - Causes increased prominence of the NLF



# Pathophysiology of the Aging Face

– 5 Osteofasciodermal or septal (ligaments)  
(Hoefflin, 1998)

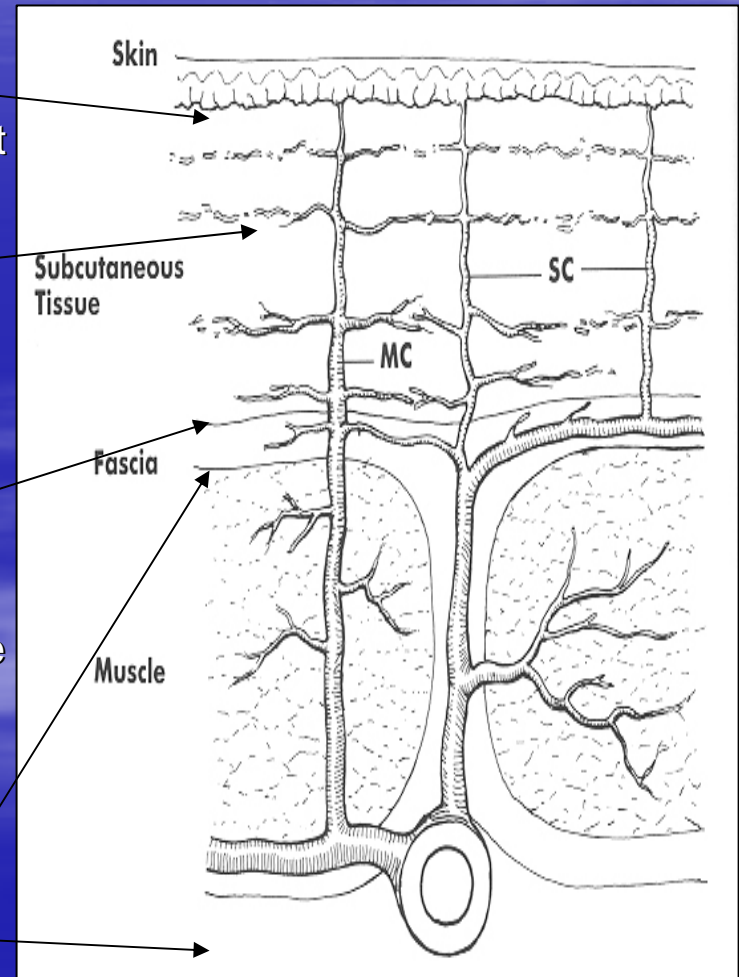
- Malar
- Parotid
- Masseteric
- Zygomatic
- Mandibular





# Anatomy

- Five planes (Hoefflin, 1998)
  - **Superficial subcutaneous plane**
    - Epidermis, dermis, and thin layer of SQ fat
    - Dissection divides subdermal plexus of vessels
  - **Mid-subcutaneous plane**
    - Contains bulk of central facial fat
    - Some fat left on the platysma/SMAS
    - Divides axial arcuate vessels
  - **Supraplatysmal plane (i.e. supraSMAS plane)**
    - Dissection is immediately superficial to the platysma
    - Natural anatomic plane
    - Preserves the arcuate vessels
  - **Subplatysmal plane (i.e. subSMAS plane)**
  - **Subperiosteal plane**



# Trivia

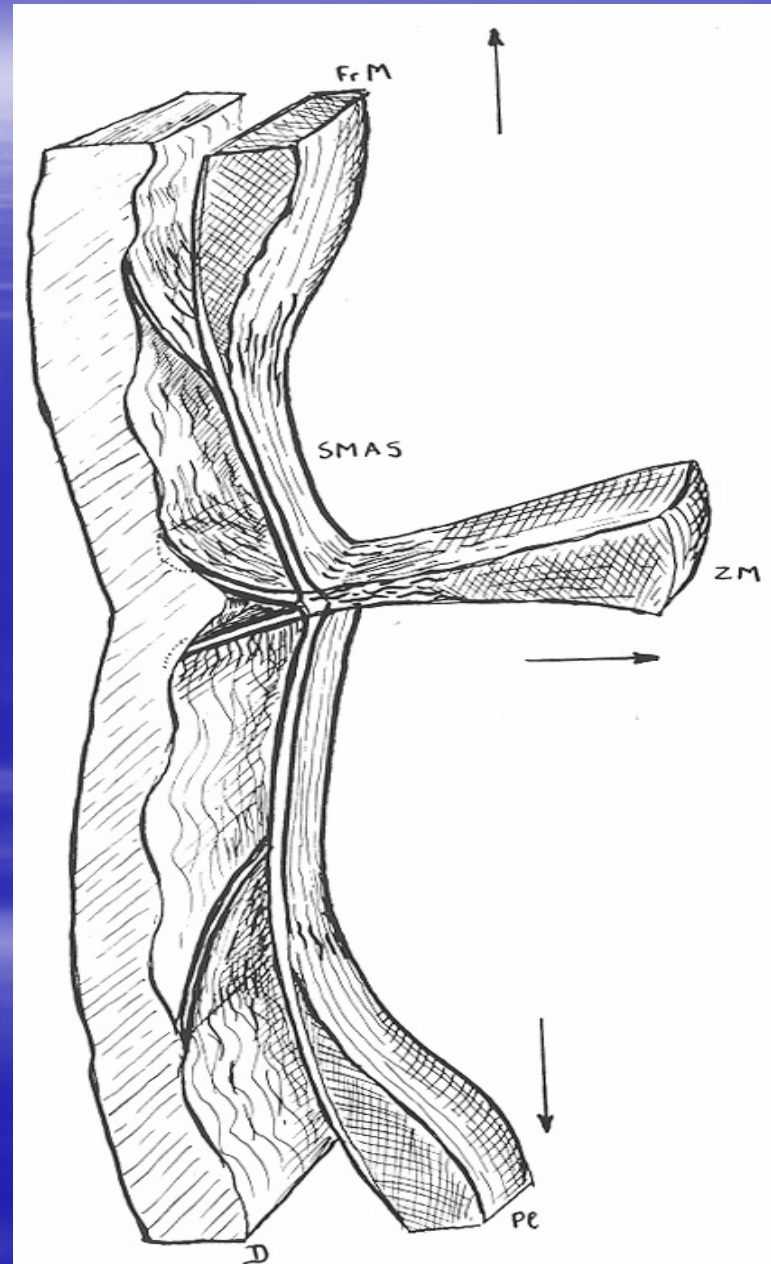
- What muscles does the SMAS invest?

# Anatomy

- SMAS

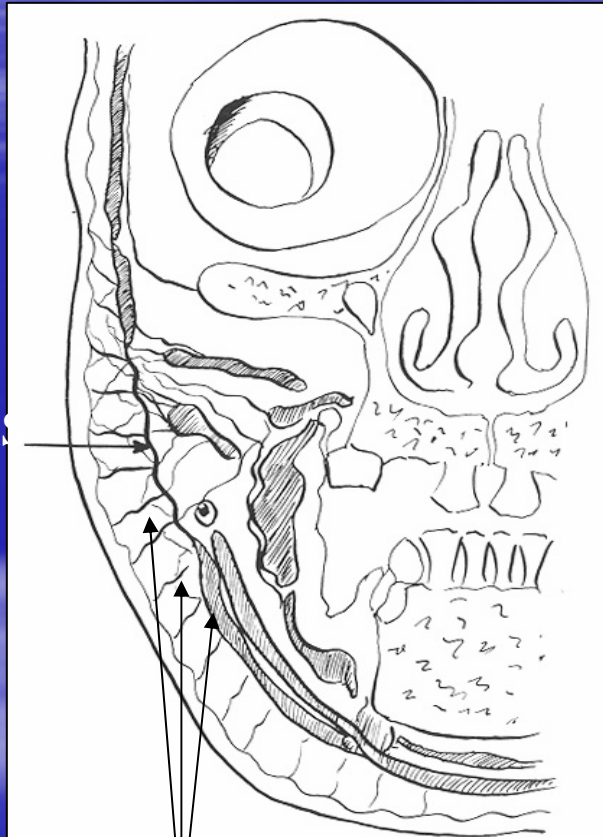
- Superficial Musculo-Aponeurotic System
- 1974 Skoog, 1976 Mitz/Peyronie
- deep to the subdermal plexus and superficial to the major vessels and nerves
- Divides subq fat into 2 layers
  - Nonseptate fat between muscles and SMAS
  - Fibrous septae connect SMAS to dermis
- Transmits forces of facial expression

- SMAS is stretched superiorly and inferiorly
- Relays contractions of facial muscles along the longitudinal network parallel to skin
- Also transmits in a perpendicular direction toward the facial skin through the fibrous septa

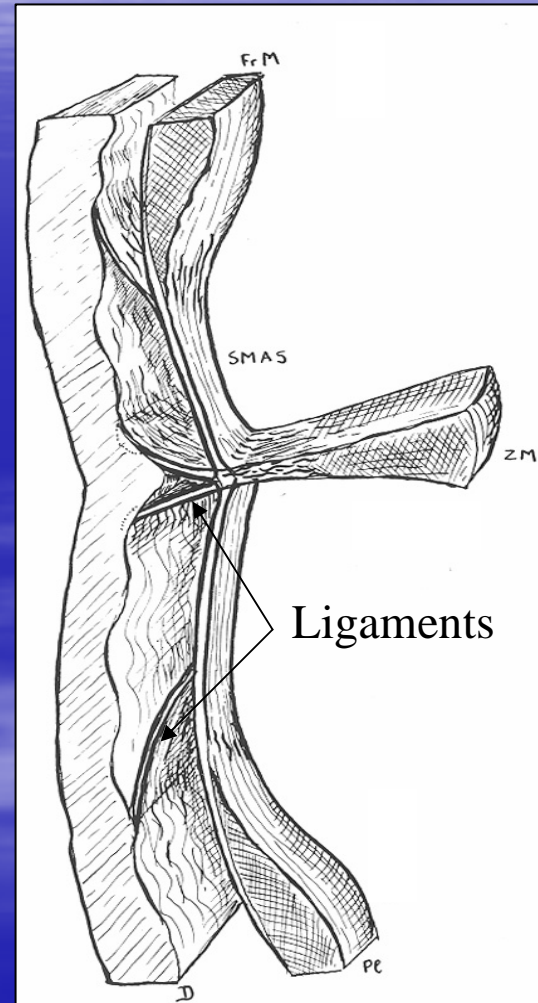




SMA

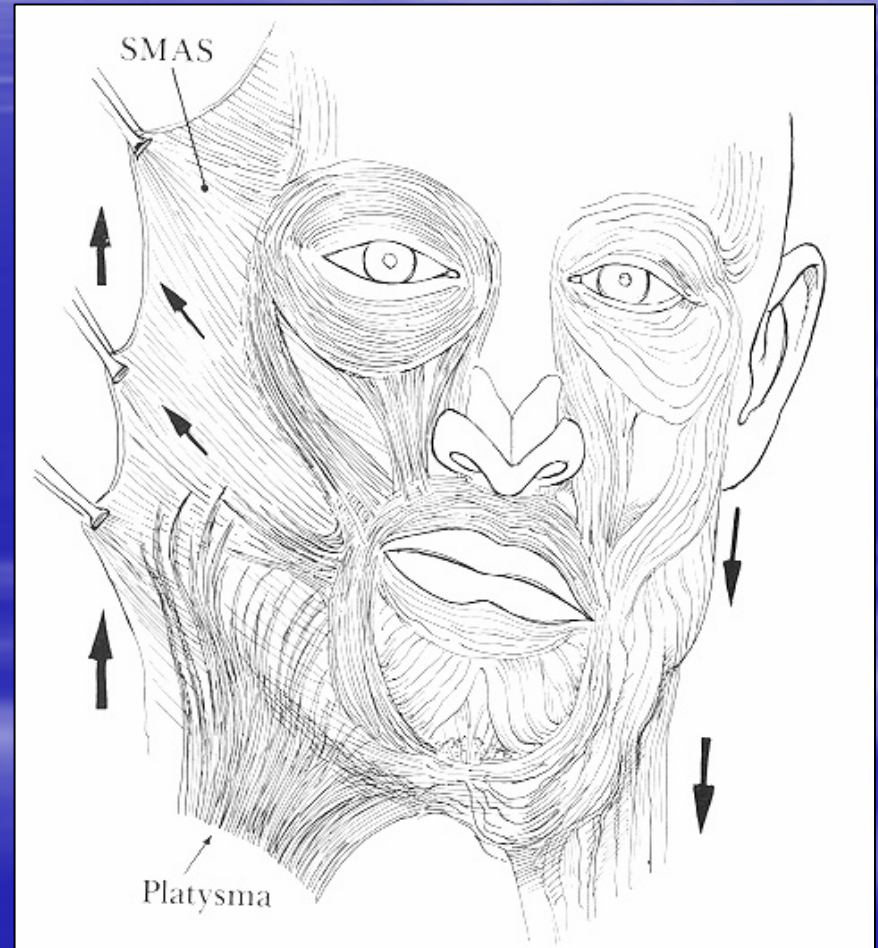


Ligaments



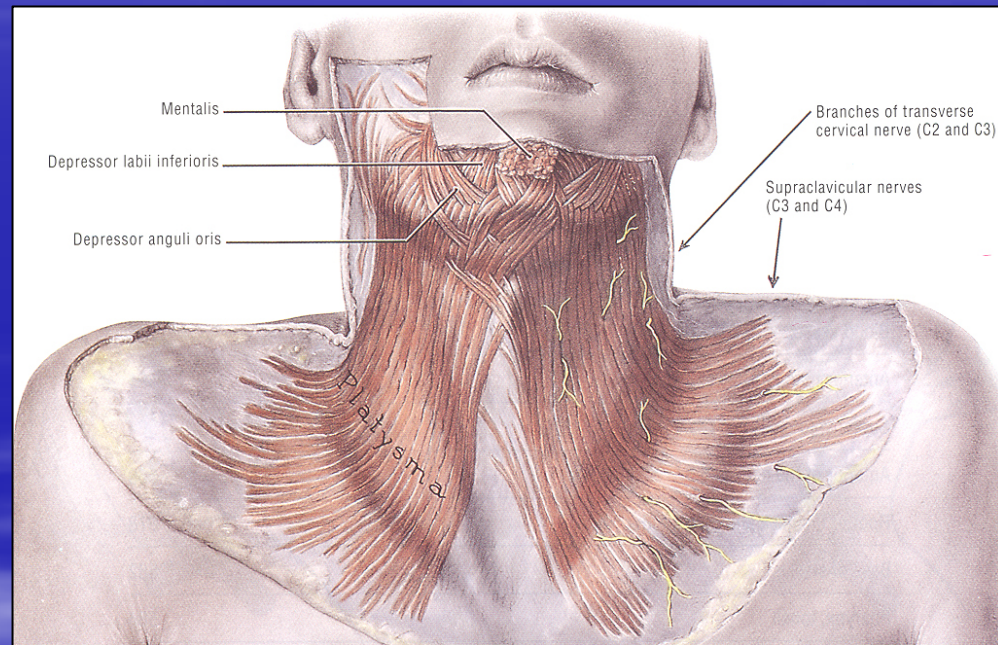
# SMAS

- Upper 3<sup>rd</sup> of face
  - Thick
  - Galea
  - Temporoparietal fascia (i.e. superficial temporal fascia)
  - Frontalis m.
- Middle 3<sup>rd</sup> of face
  - Tightly adherent to,
  - Zygomaticus maj. & min.
- Lower 3<sup>rd</sup> of face
  - Platysma & lip depressors



# SMAS

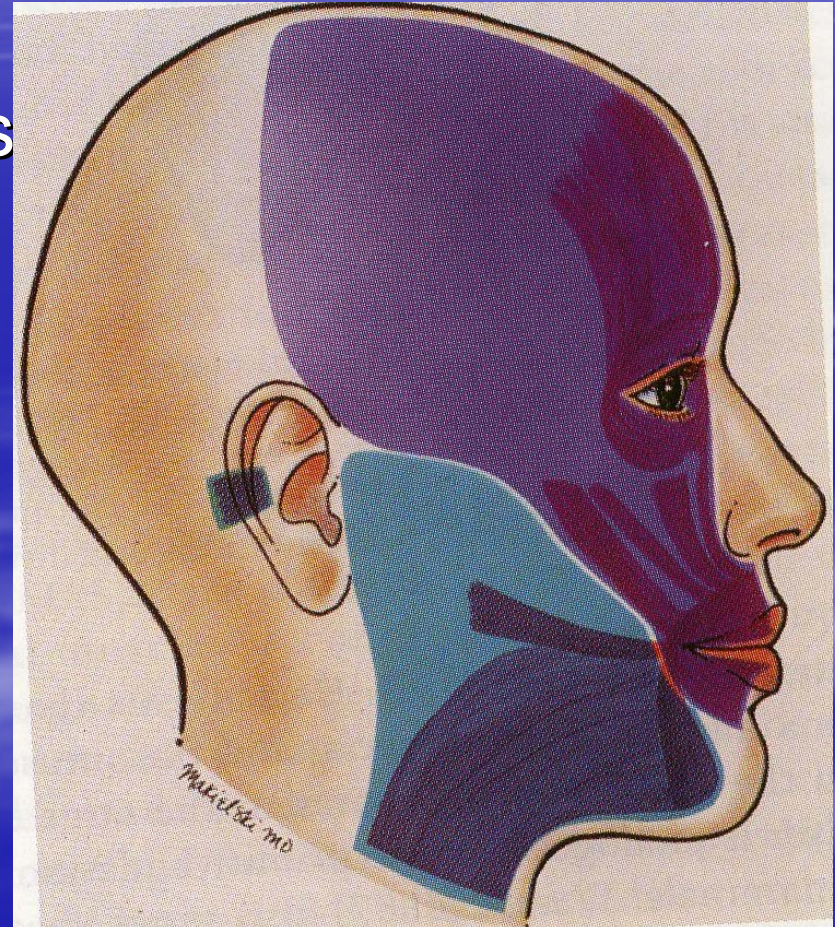
- Platysma
  - Origin: clavicles and 1<sup>st</sup> rib
  - Insertion: blends with the SMAS and lip depressors





# SMAS

- Upper SMAS
  - Sphincter colli profundus
    - Mid and upper face
    - Firm bony attachments
- Lower SMAS
  - Primitive platysma
    - Risorius
    - Platysma
    - Depressor anguli oris
    - Auricular muscles

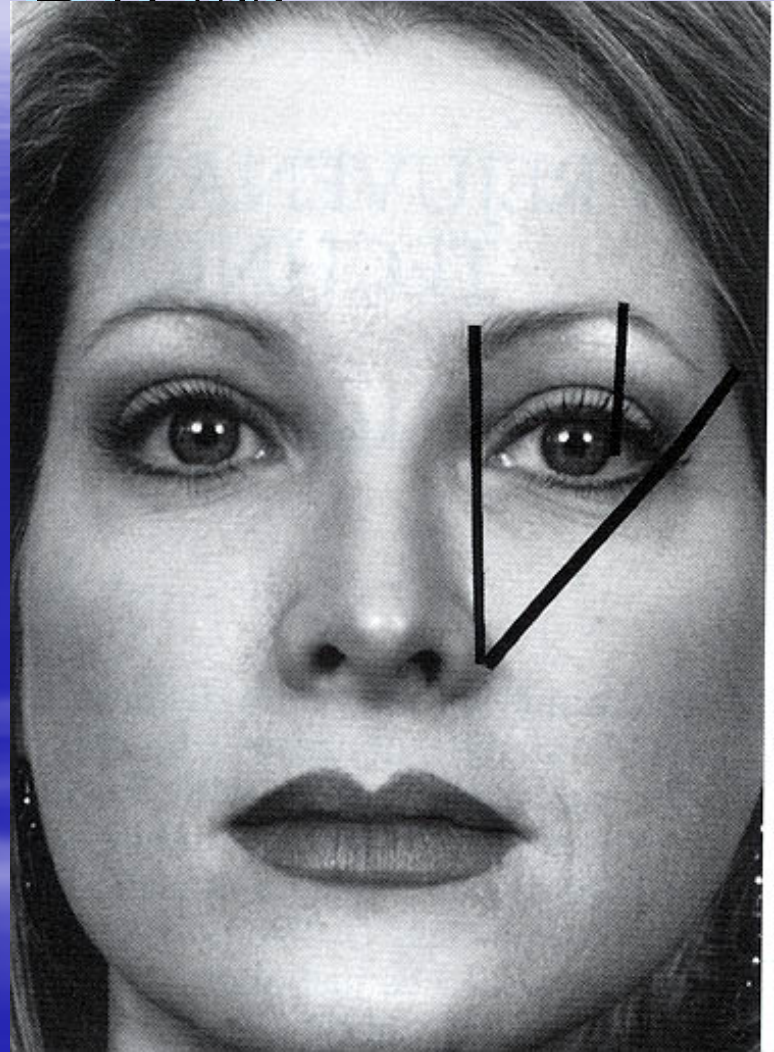


# Ideal Aesthetic Position of Brow

- Begins medially at vertical line drawn perpendicular through alar base
- Terminates laterally at oblique line drawn through lateral canthus and alar base
- Medial and lateral brow at same level
- Medial brow club shaped, tapers laterally
- Apex on vertical line through lateral limbus
- Arches above orbital rim in women and at brow in men

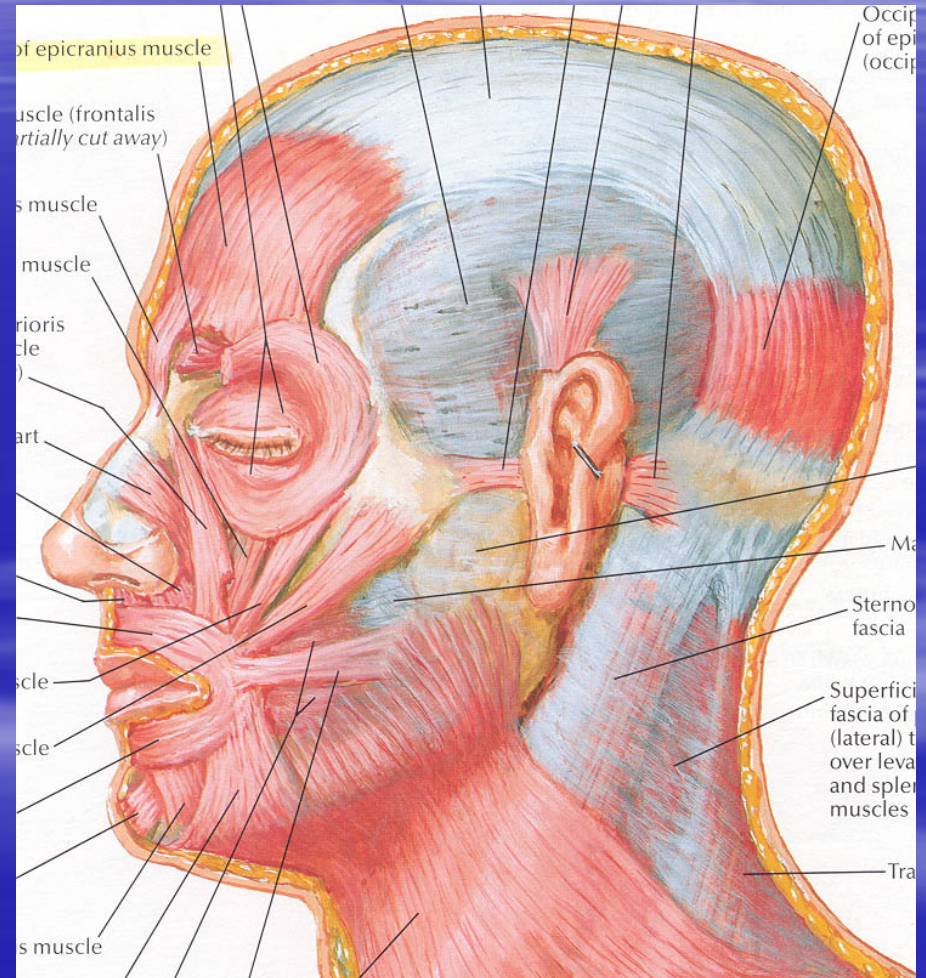


# Ideal Brow



# Brow Anatomy

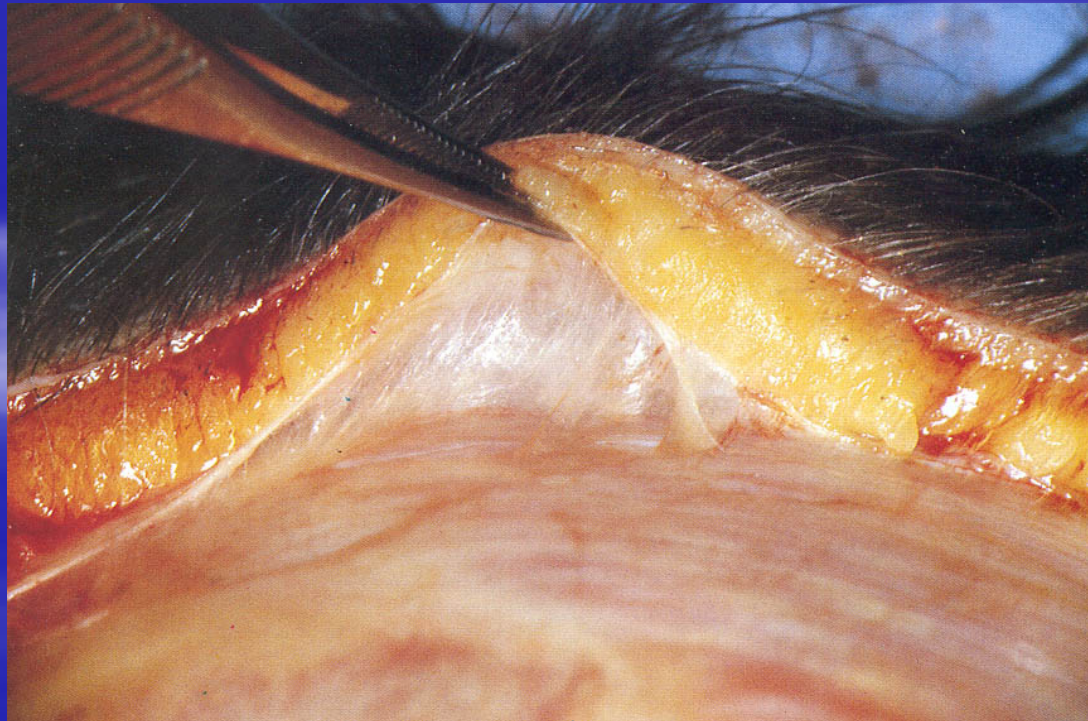
- Frontal hairline to glabella
  - Two compartments
    - Central
      - Above arcus marginalis
      - Medial to conjoint
    - Lateral
      - Lateral to conjoint
      - Superficial to superficial
- Layer of deep temporalis fascia
- fascia





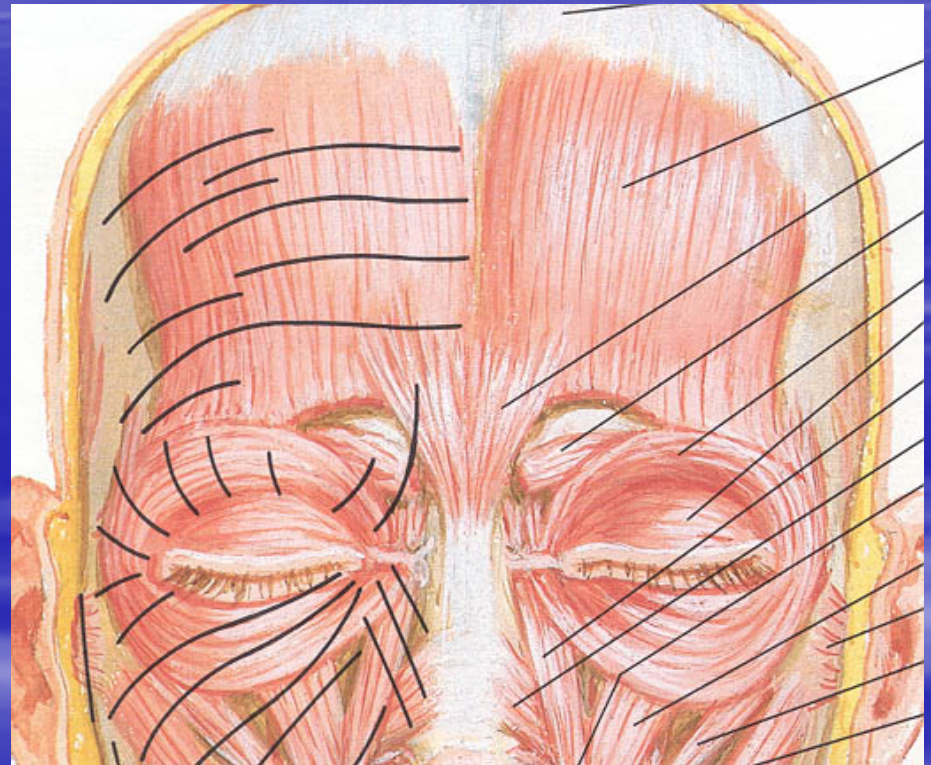
# SCALP

- Layers-skin, subcutaneous tissues, aponeurosis, loose areolar tissue, periosteum

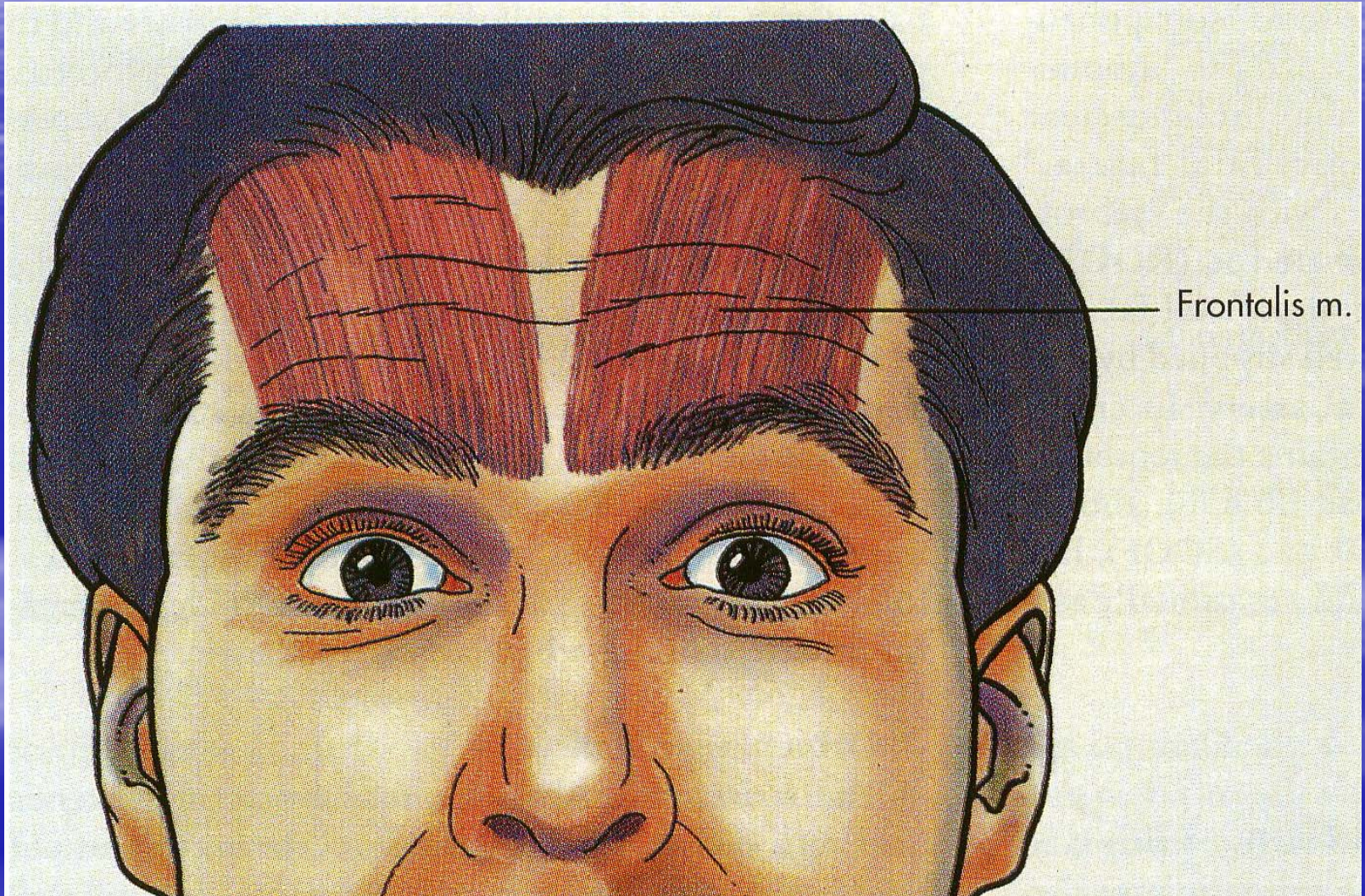


# Trivia

- Brow Elevators?
- Brow Depressors?





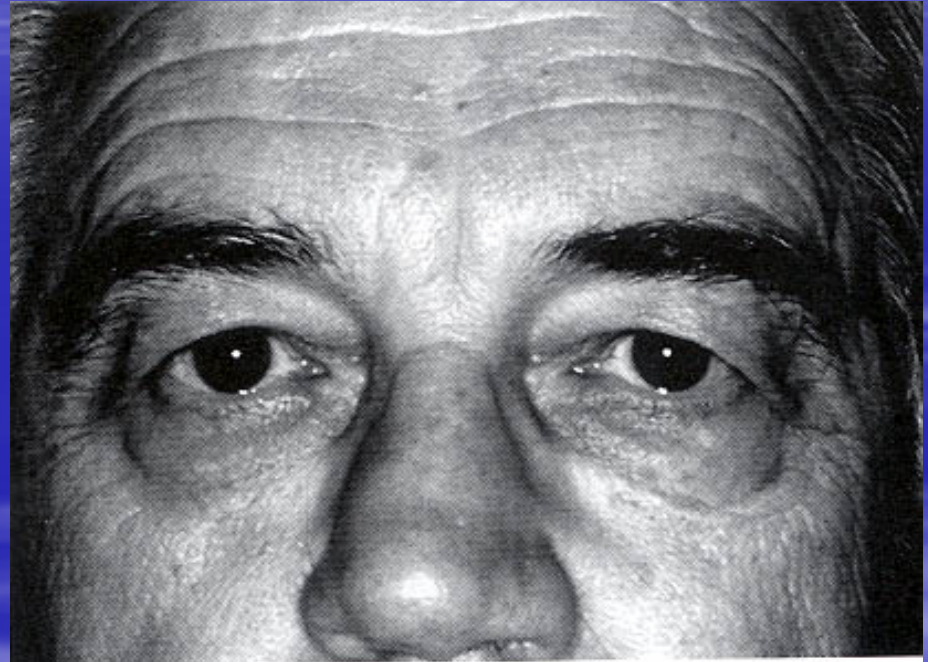


Frontalis m.



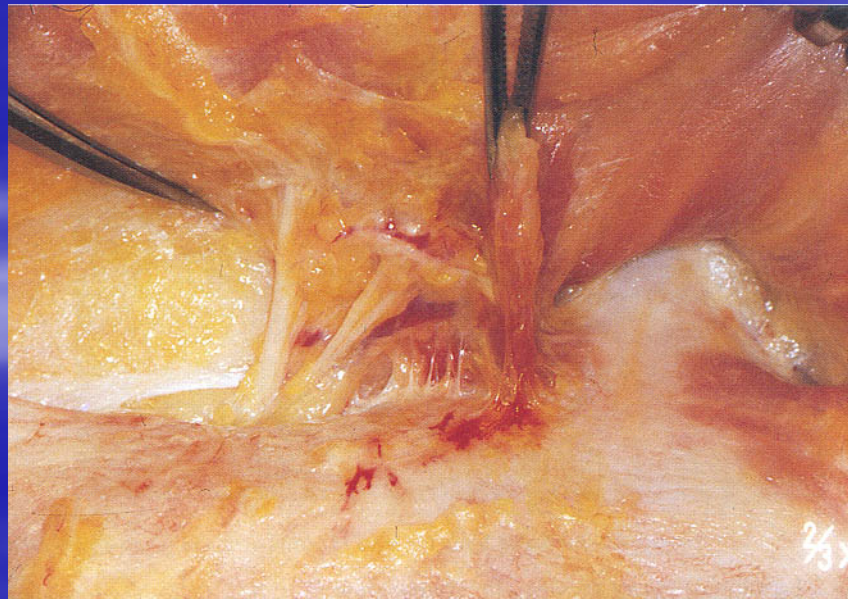
# Central Brow

- Frontalis only elevator, horizontal furrows
- Corrugator, procerus, medial orbicularis, depressor supercilii
  - Corrugator-vertical glabellar lines
  - Procerus-horizontal glabellar lines
  - Orbicularis-lateral crows feet



# Central brow

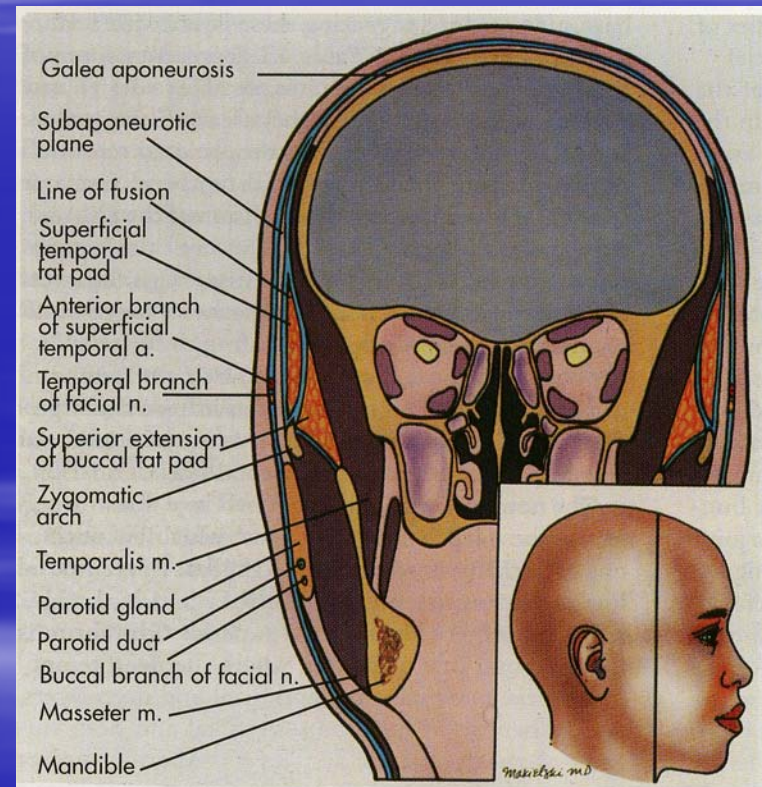
- Neurovascular supply
  - Supratrochlear, supraorbital branches of V1
  - Emerge orbit pierce periosteum ant orbital rim, deep to orbicularis, over corrugator, superficial to frontalis



# Temple Anatomy

SDTF inserts lateral  
zygoma

DDTF inserts medial  
zygoma



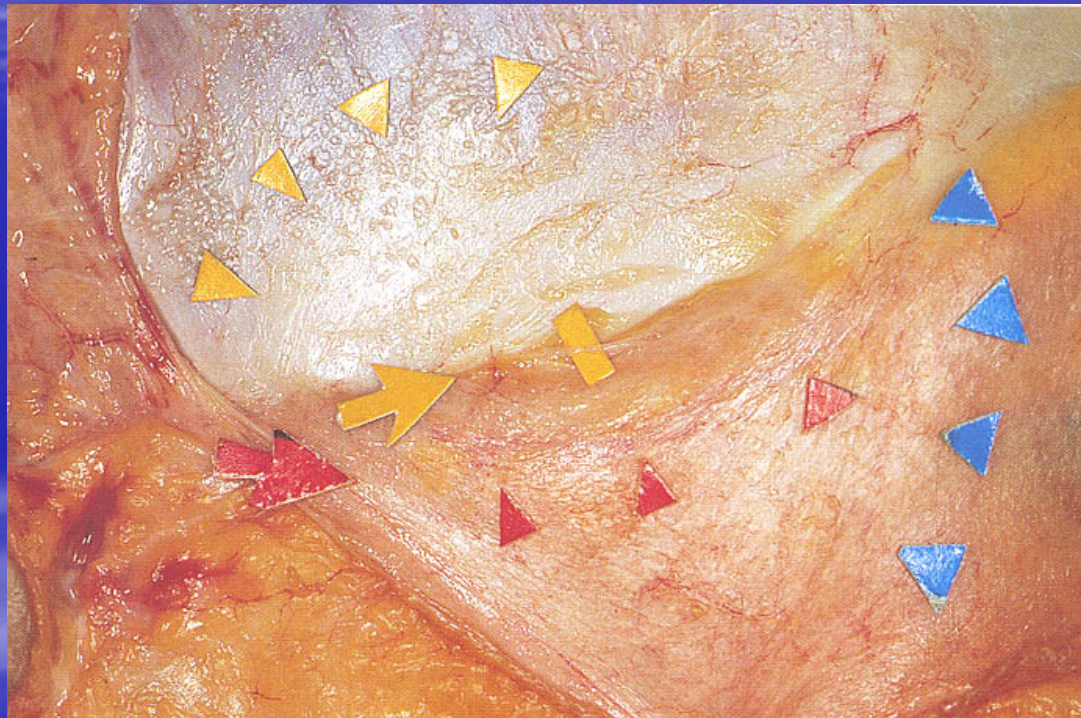


# Temple Anatomy

**TABLE 1.1**  
**SOFT-TISSUE LAYERS IN THE TEMPORAL AREA**

Layers	Alternate Names
Skin	None
Subcutaneous fat	None
Temporal parietal fascia	SMAS Superficial temporal fascia
Subaponeurotic plane	Subgaleal fascia Innominate fascia Areolar fascia Loose areolar tissue
Temporal parietal fat	Superficial temporal fat (Ramirez, 1991)
Superficial layer deep temporal fascia	Intermediate temporal fascia (Ramirez, 1991)
Superficial temporal fat pad	Intermediate temporal fat (Ramirez, 1991)
Deep layer deep temporalis fascia	Deep temporal fascia
Deep temporal fat pad	None

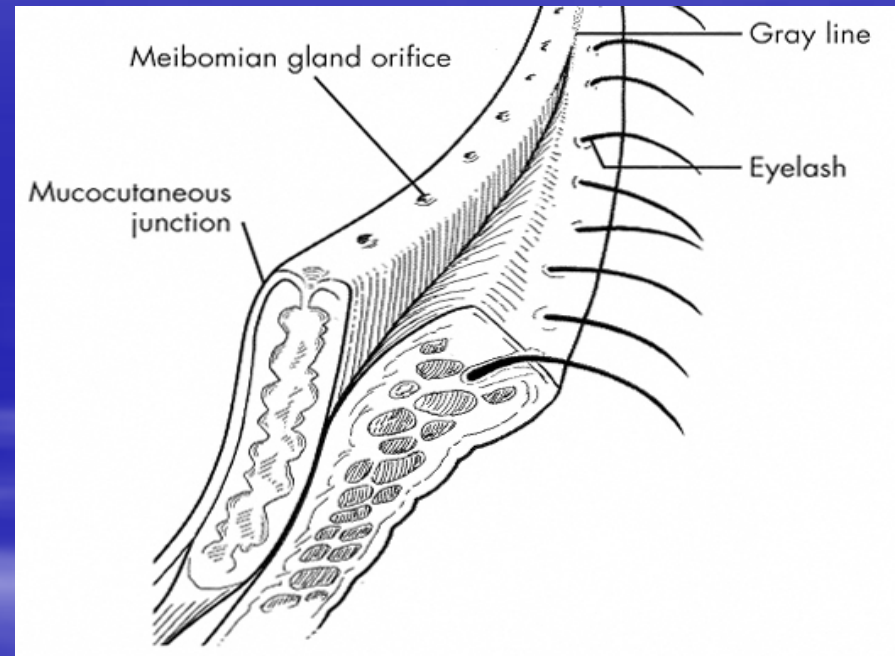
# Lateral Brow-Facial Nerve





# Anatomy

- Tarsus
  - Dense, fibrous tissue
  - Contour and skeleton
  - Contain meibomian glands
  - Length – 25 mm
  - Thickness – 1 mm
  - Height
    - Upper plate – 10 mm
    - Lower plate – 4 mm

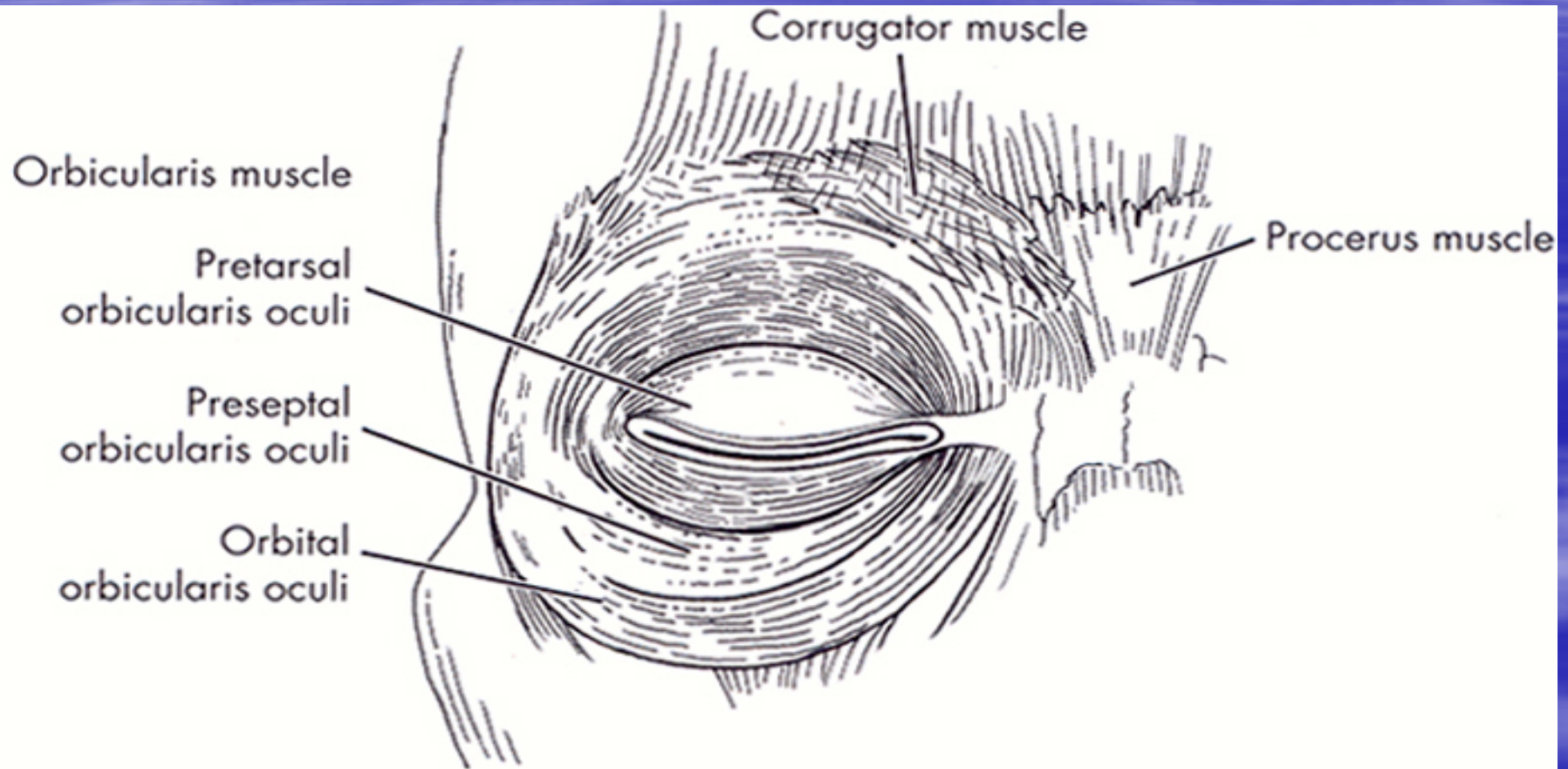


# Anatomy – Muscles

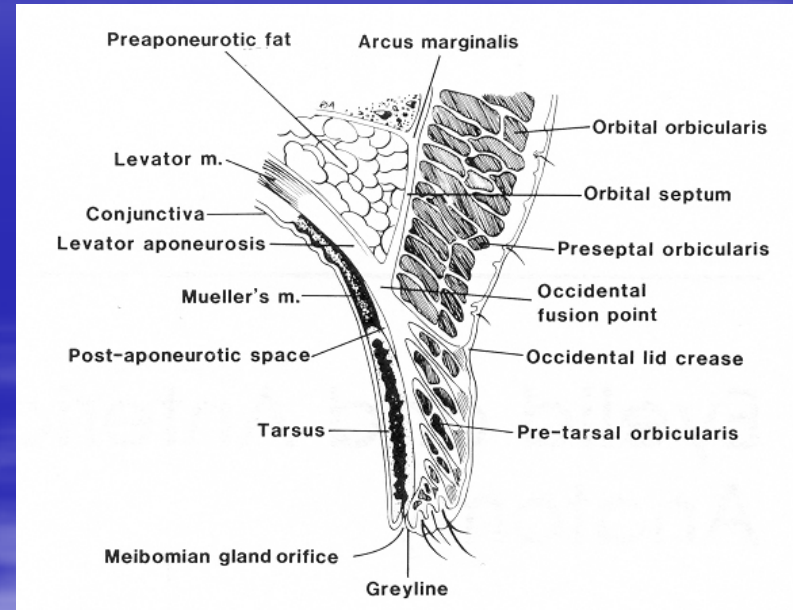
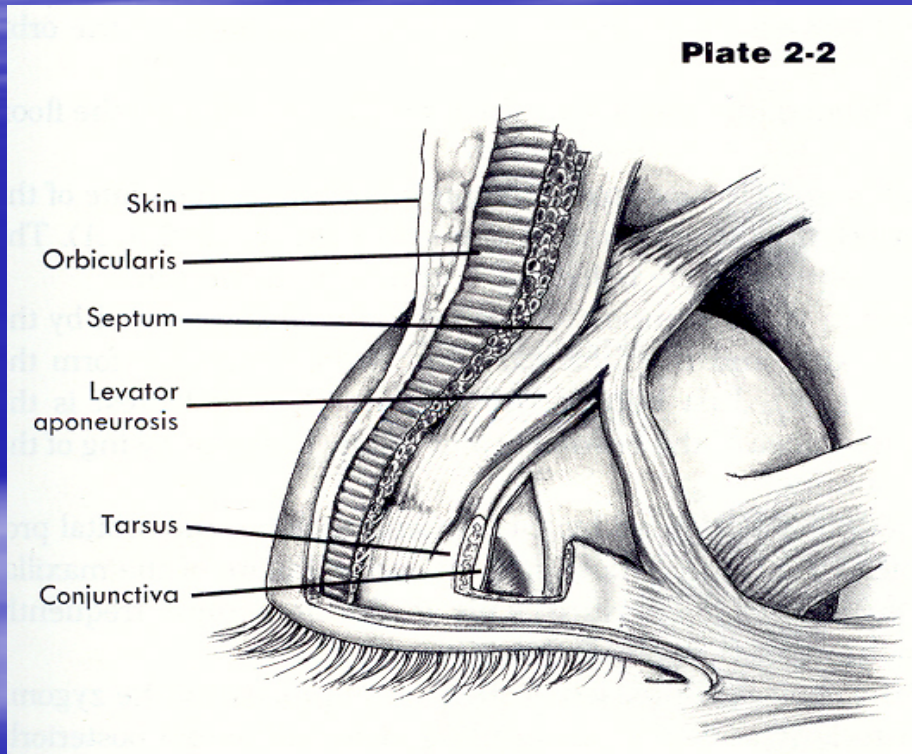
- Protractor
  - Orbicularis
- Retractors
  - Levator
  - Müller's



# Orbicularis Oculi Muscle

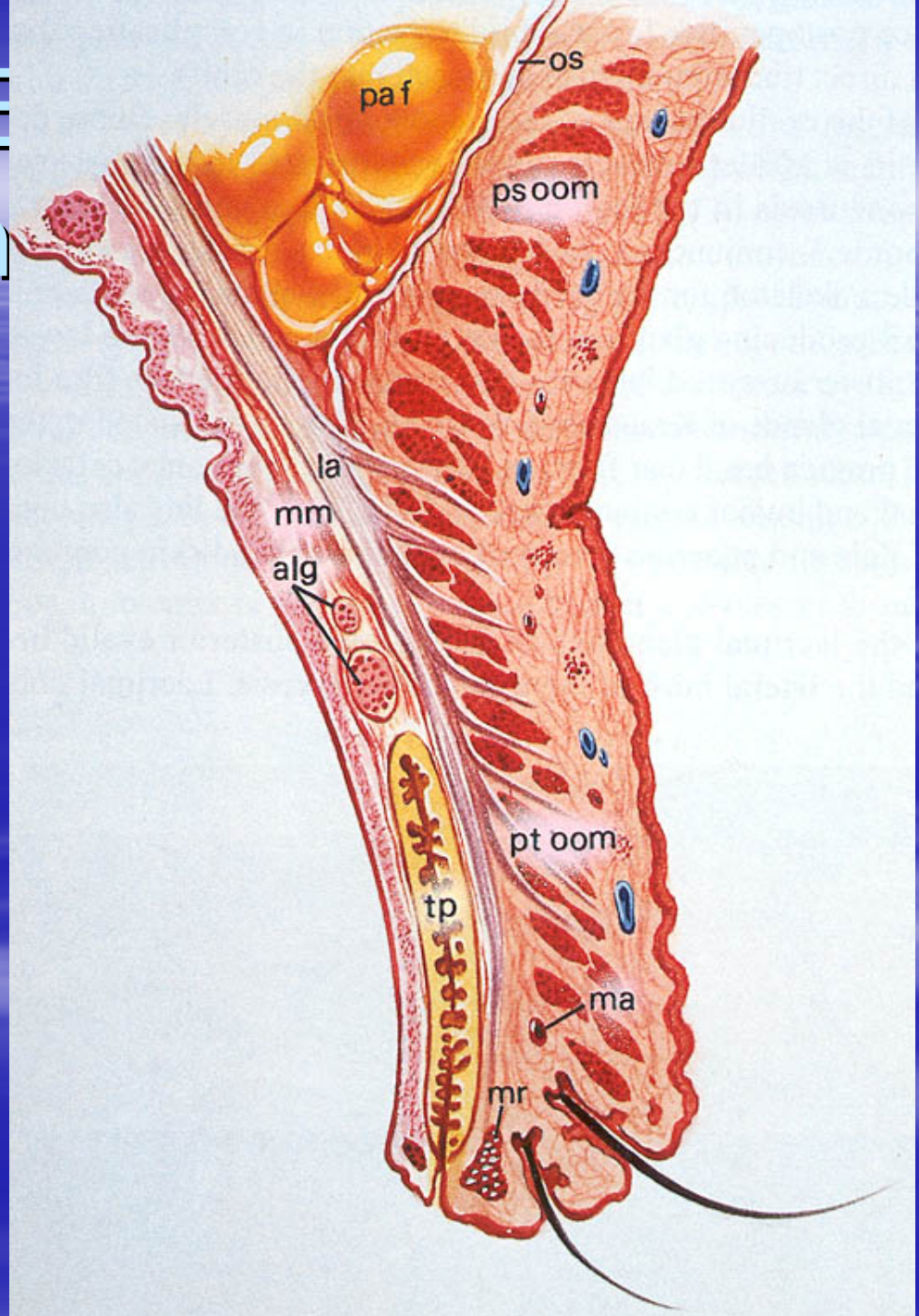


# Levator palpebral superioris and Müller's muscle

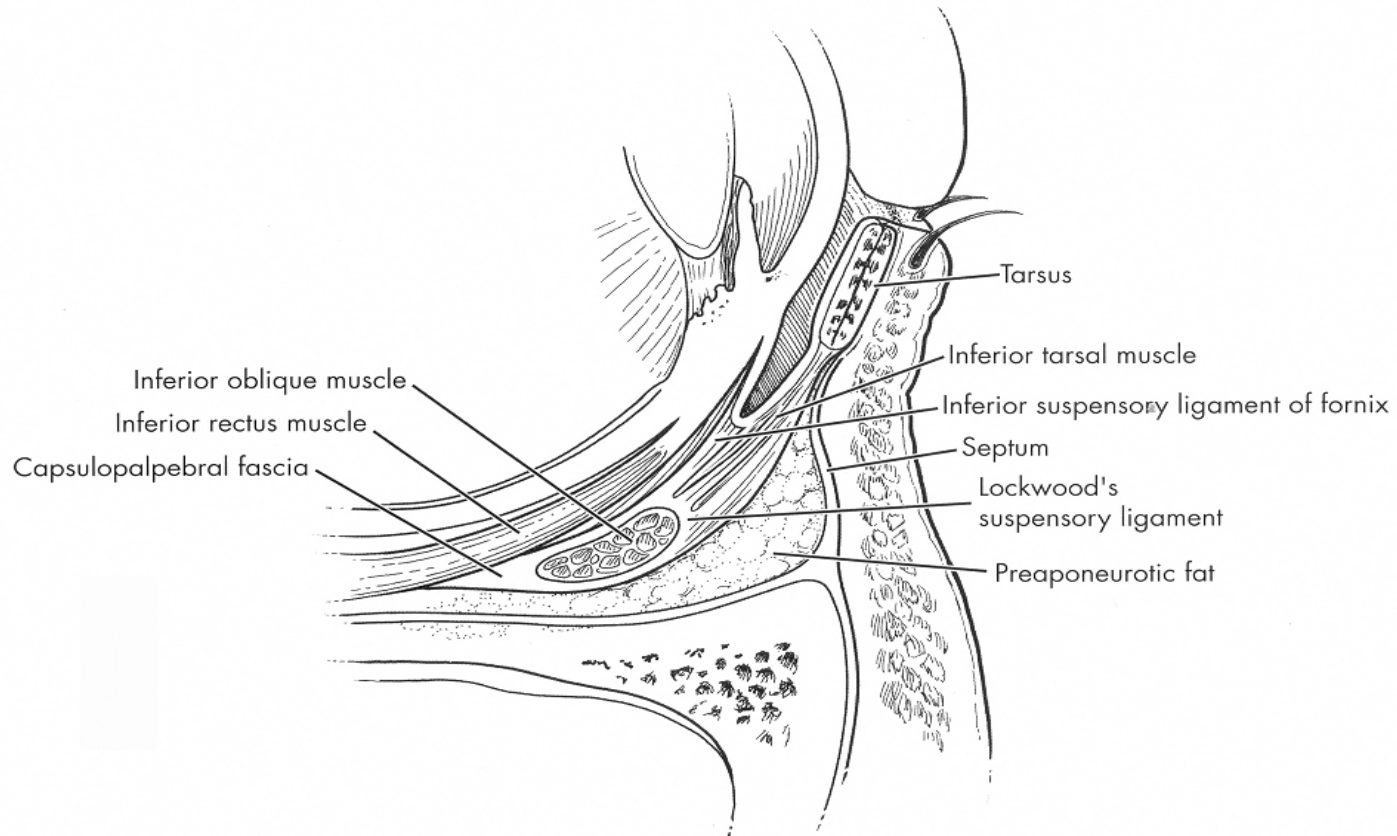




E  
An



# Lower Lid Anatomy

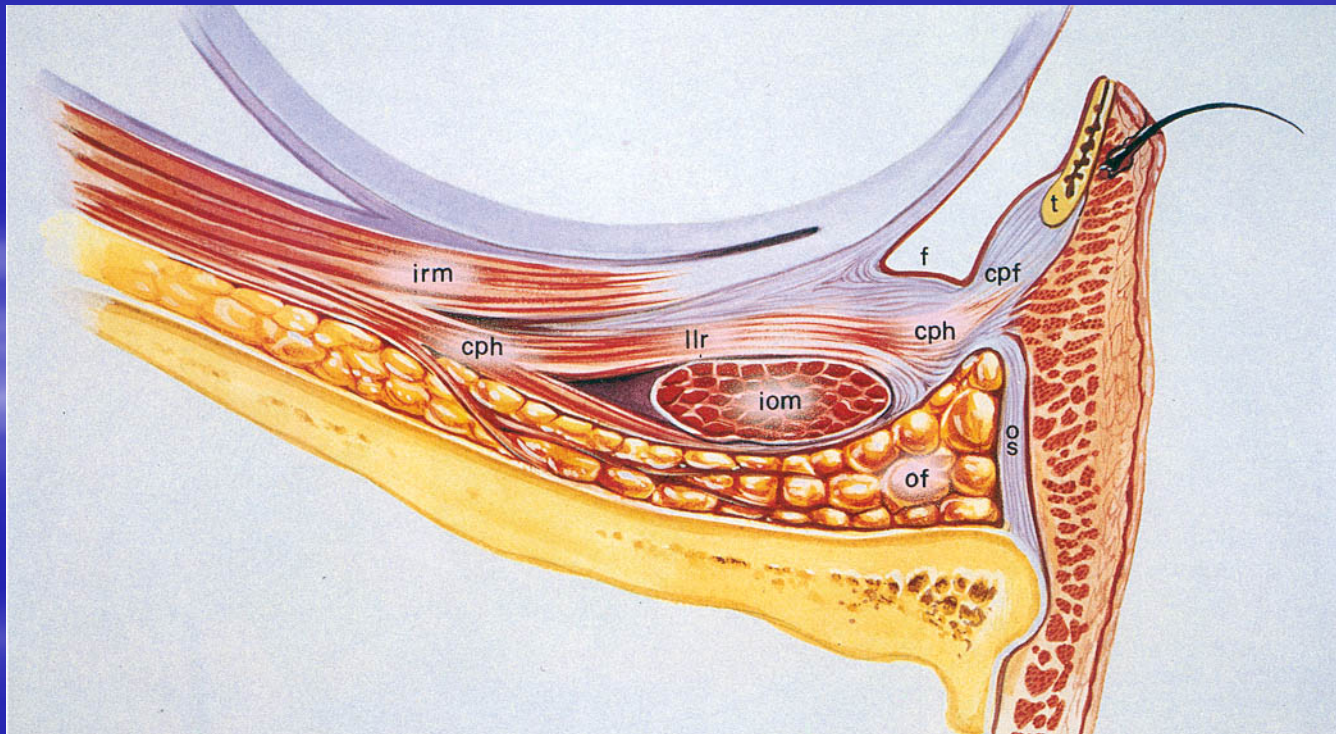


**Fig. 2-28** Cross-section of the lower eyelid retractors.



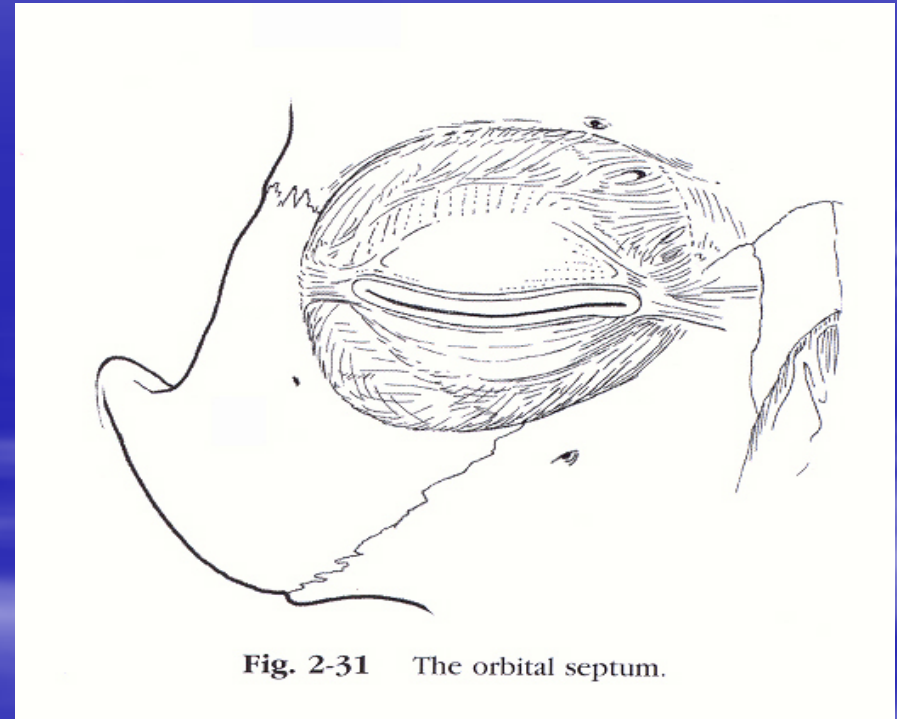
# Eyelid Anatomy-Septum/Tarsus

- Arcus marginalis-confluence of periosteum and periorbita origin of orbital septum
- Tarsus
  - 8-10 mm upper, 4-5 mm lower



# Anatomy

- Orbital Septum
  - Fascial barrier
  - Underlies posterior orbicularis fascia
  - Defines anterior extent of orbit and posterior extent of eyelid

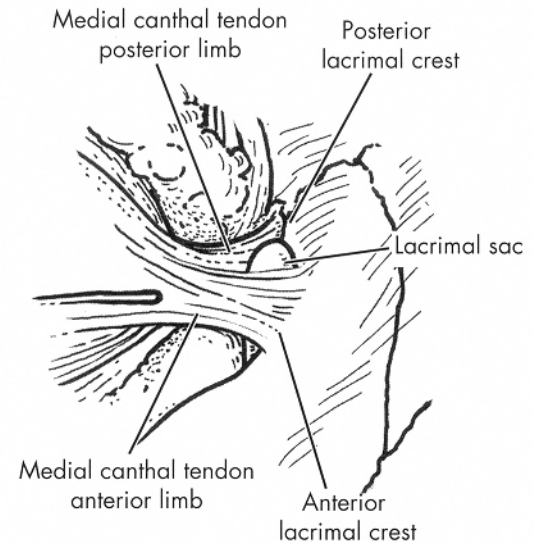
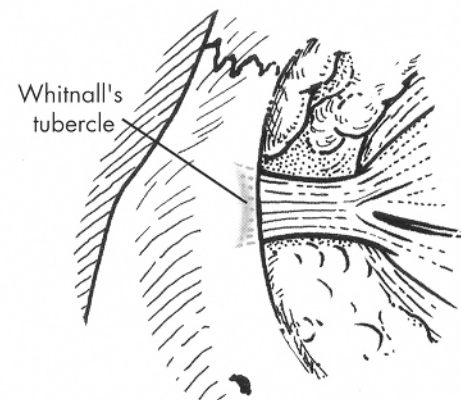
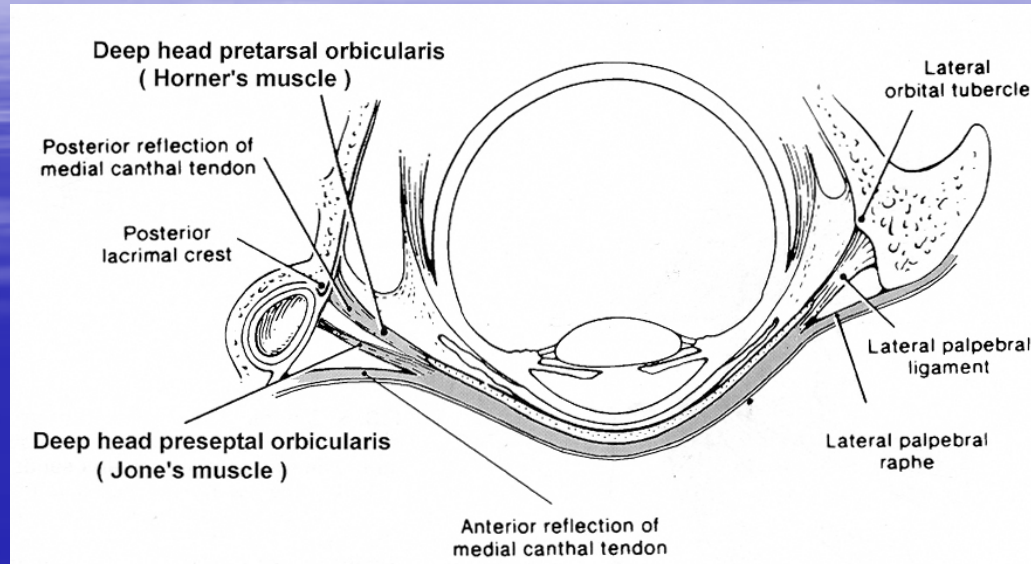


# Anatomy

- Canthal tendons
  - Extensions of preseptal & pretarsal orbicularis
  - Lateral slightly above medial
  - Lateral tendon attaches to Whitnall's tubercle  
1.5 cm posterior to orbital rim
  - Medial tendon complex, important for lacrimal pump function

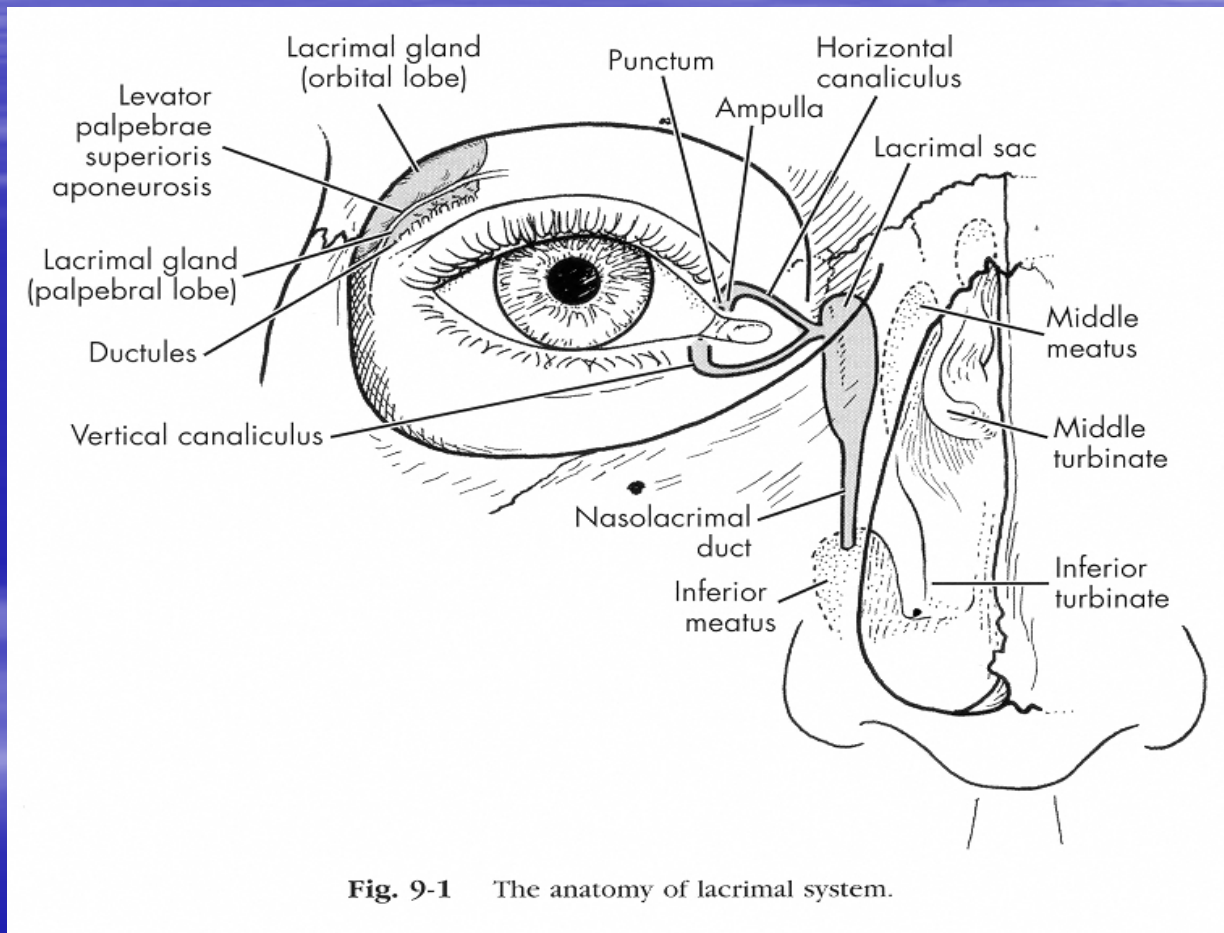


# Canthal Tendons

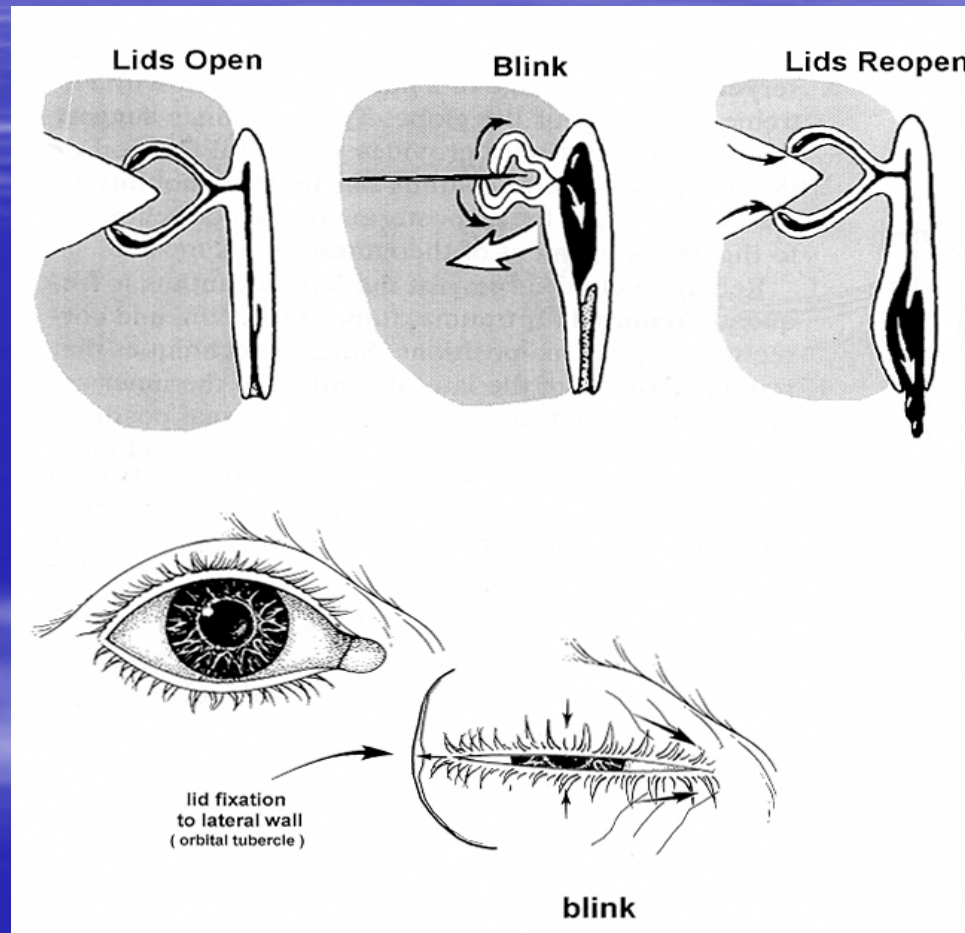




# Lacrimal System

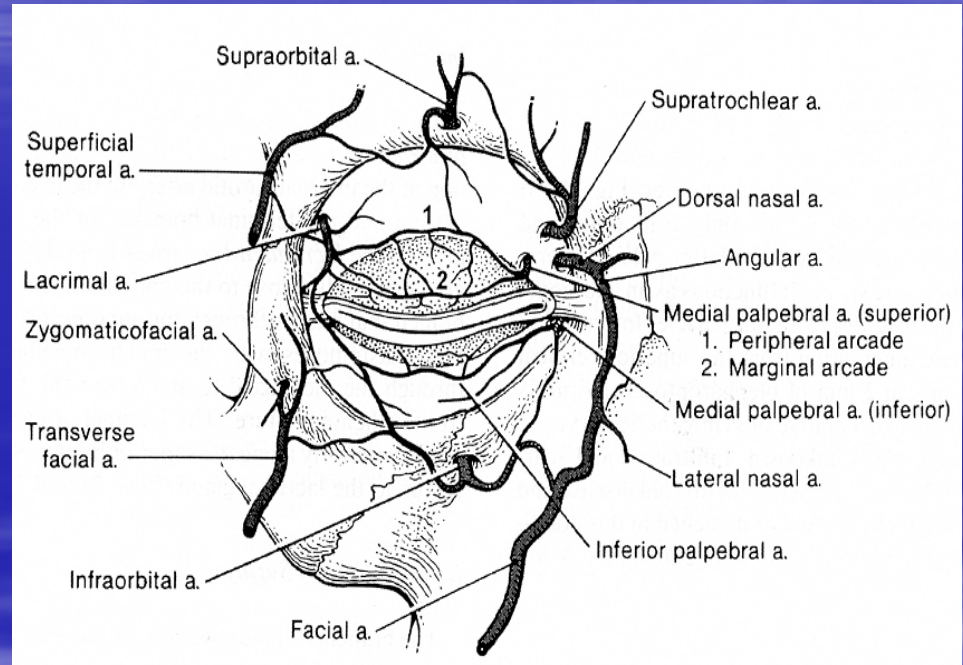


# Lacrimal Excretory Pump



# Anatomy – Blood Supply

- Rich anastomoses from internal and external carotids
- Marginal arcades – 2 to 3 mm from lid margin
- Peripheral arcade – upper lid between levator aponeurosis and Müller's muscle





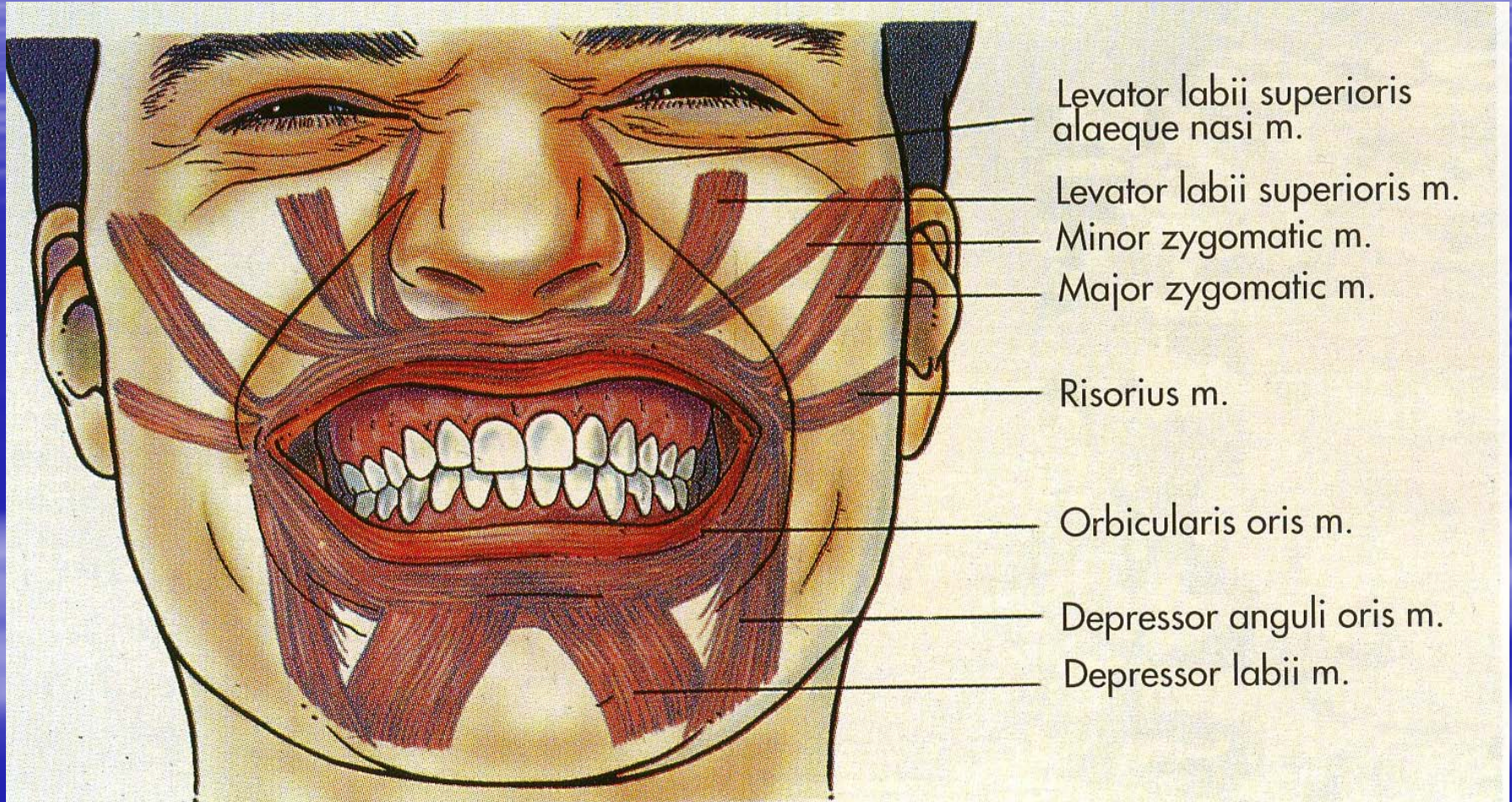
# Eyelid Anatomy

- Orbicularis oculi transition brow to upper eyelid
  - Orbital, palpebral, divided pretarsal, preseptal
- Orbital septum anterior/posterior lamella
- Anterior lamella-skin, orbicularis
- Posterior lamella-conjunctiva, upper/lower elevators/retractors
- Middle lamella septum/tarsus

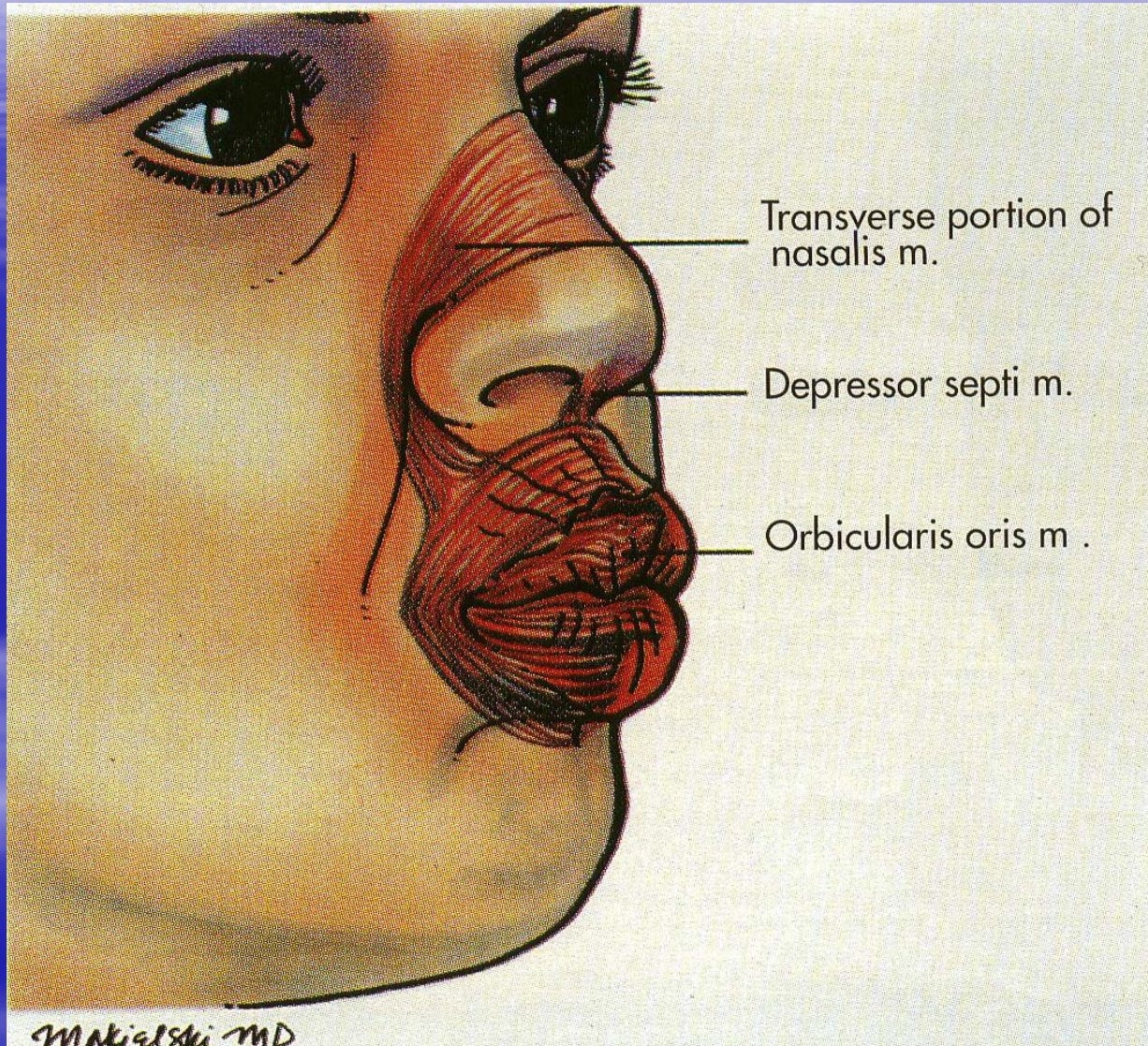
# Eyelid Anatomy-orbital Fat

- Preaponeurotic fat, deep to septum
  - Landmark for depressors, elevators
  - Upper lid two compartments
    - Medial, middle (largest)
    - Lateral occupied by lacrimal gland
  - Lower lid three
    - Medial, central, lateral
    - Inf. Oblique separates medial/central





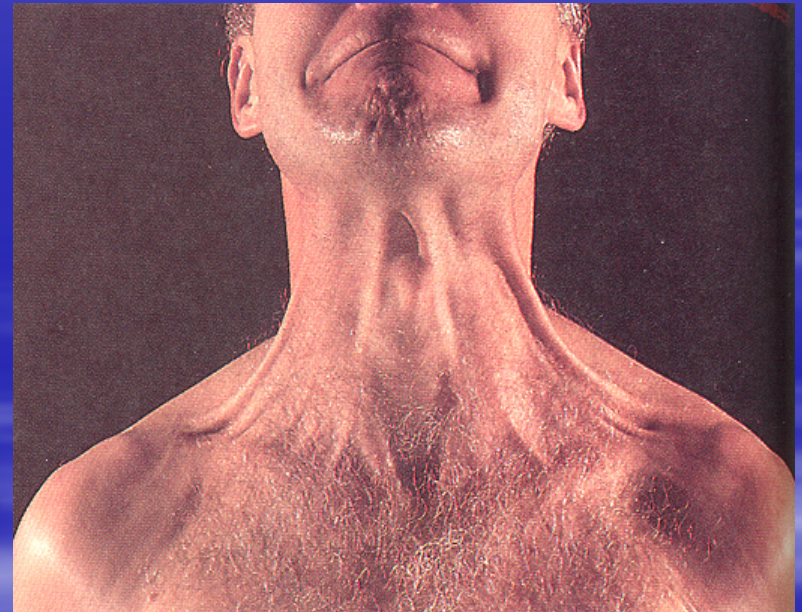






# Anatomy

- Platysma muscle
  - from the lower cheek to the level of the second rib
  - Three variations of the anterior borders of the right and left platysma muscle
    - Type1: separated in the suprahyoid region and interlacing 1 to 2 cm from the chin
    - Type2: intermingled at the level of the thyroid cartilage
    - Type3: remained completely separated along the entire length

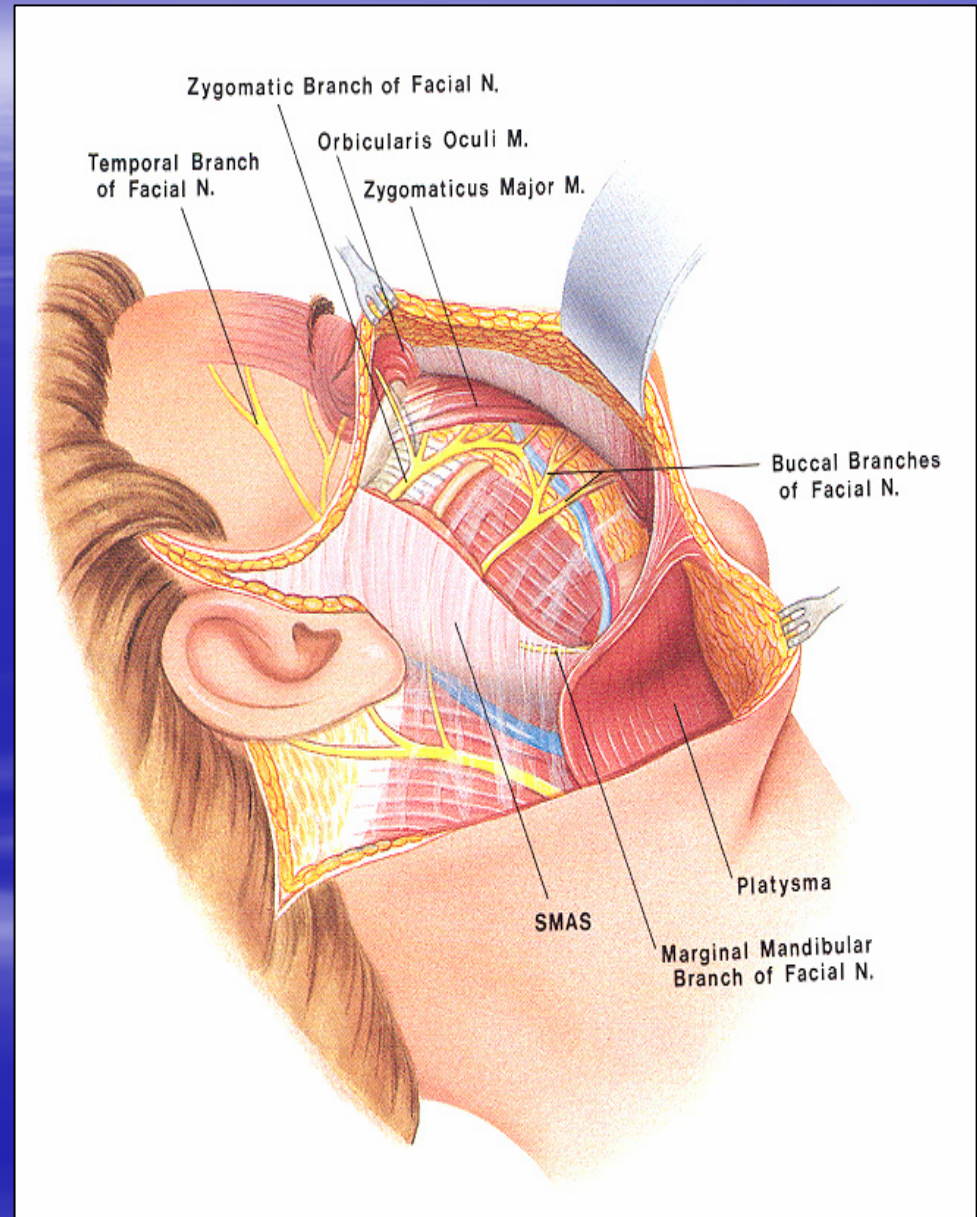


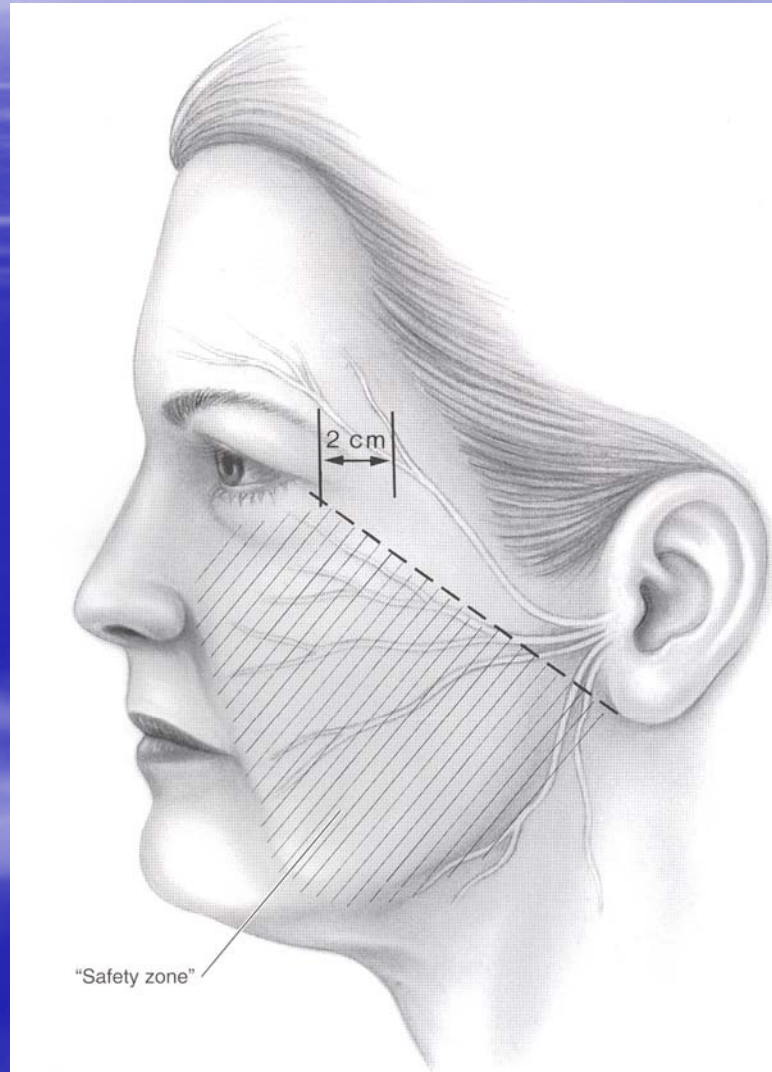
- Laxity in the platysma  
= Bands





- Facial nerve
  - Protected by superficial lobe of the parotid gland
  - travels beneath the parotidomasseteric fascia
  - Innervates superficial facial mimetic muscles from deeper surface



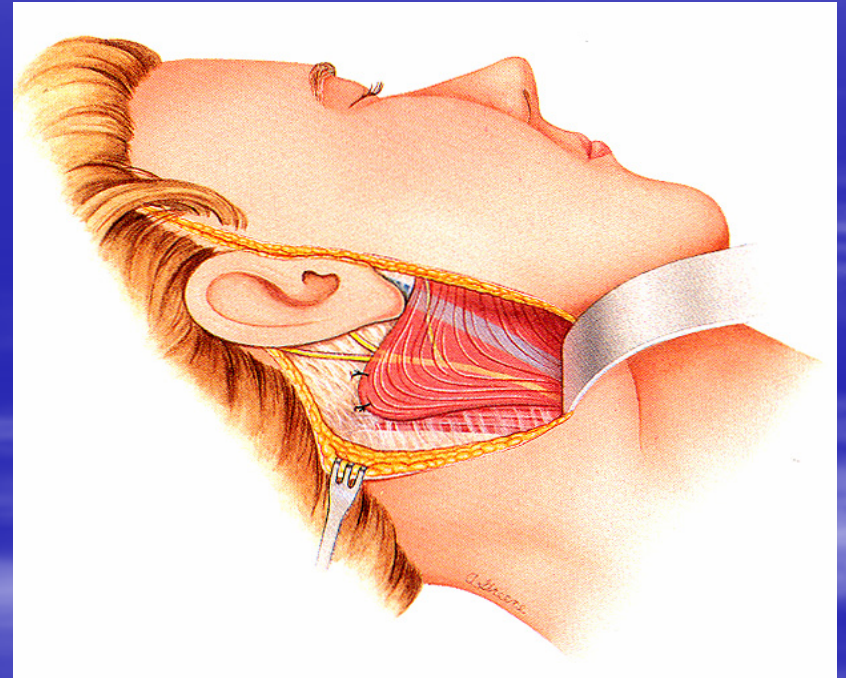
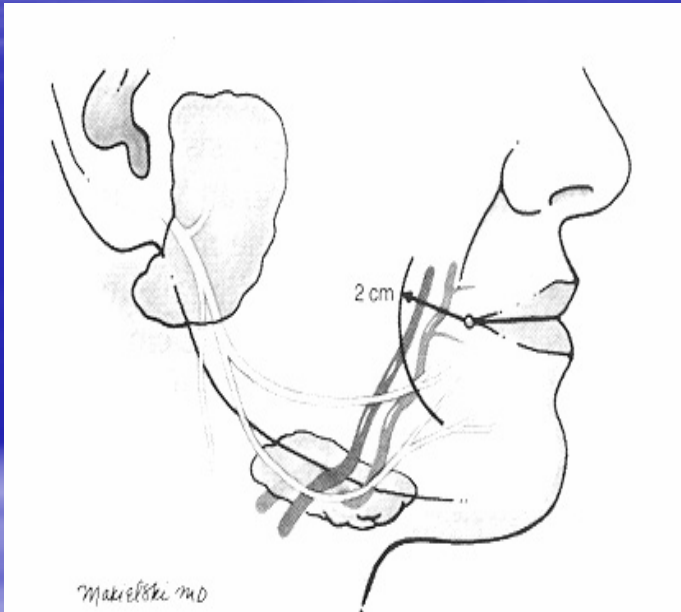


# Techniques

- Subcutaneous lift
- SMAS lift
- Deep-plane lift
- Composite lift
- Subperiosteal lift

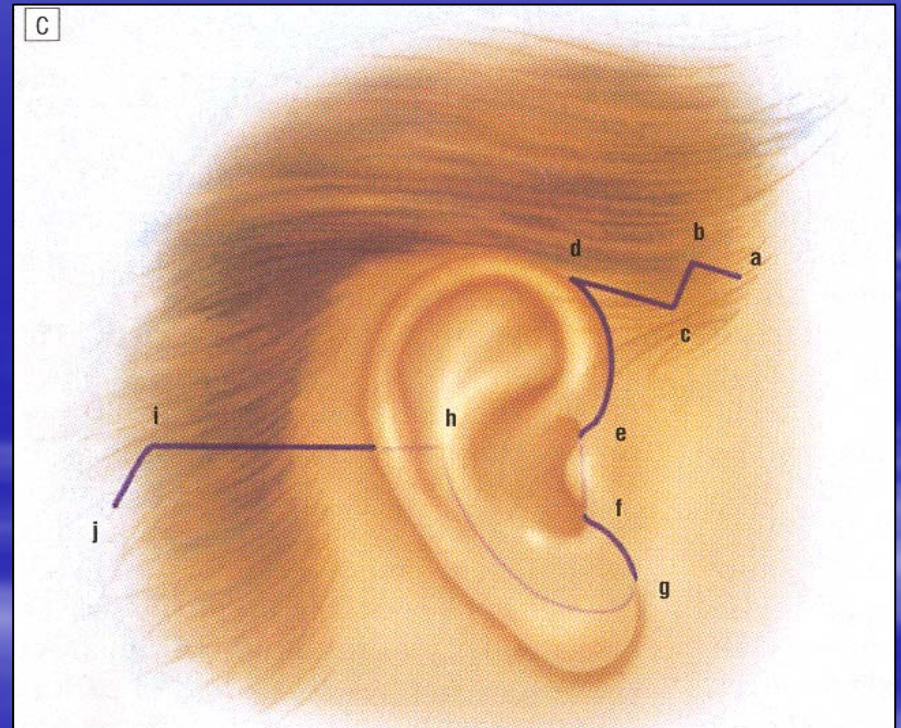


# SMAS Facelift



# SMAS lift

- Incision



# SMAS lift

- Flap elevation
  - Start at peri-auricular area
  - Temple: subfollicular/ subcutaneous
  - Parotid: subcutaneous to a line from lateral canthus to angle of mandible
  - Posterior scalp: subfollicular / superficial subcutaneous
  - Neck: over SCM and superficial to platysma

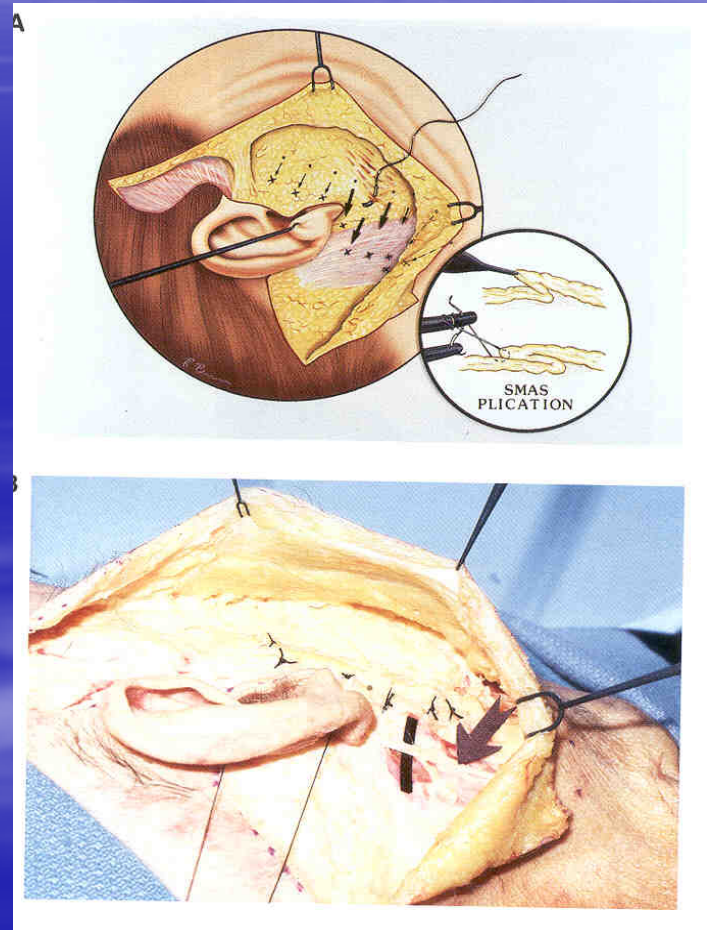




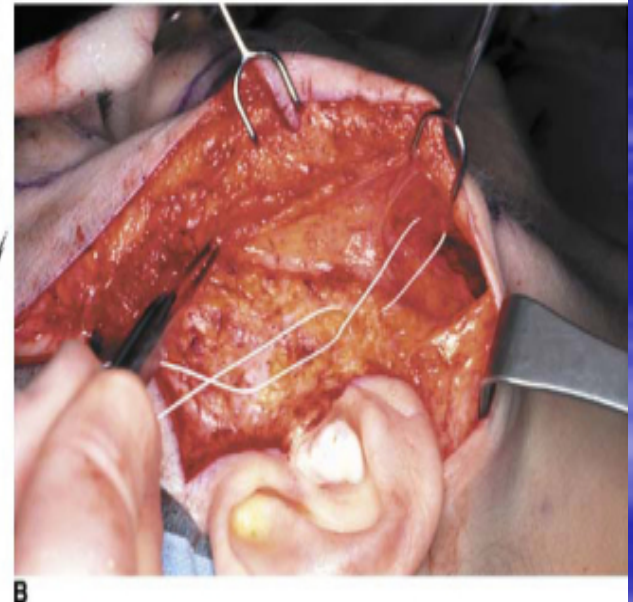
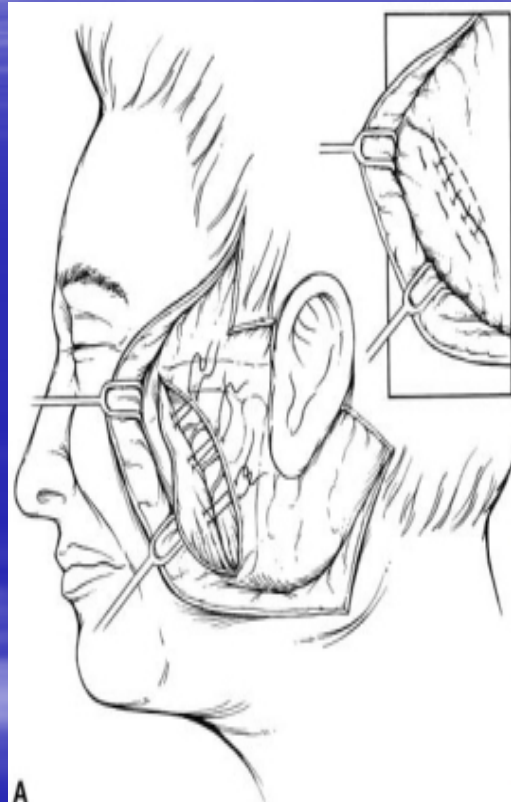
# SMAS lift

## ■ SMAS plication

- sutures that fold the SMAS onto itself to shorten it
- pulled in posterosuperior direction
- The first suture is applied at the jaw line and is anchored at the mastoid periosteum, or deep tissues in the pre-auricular area

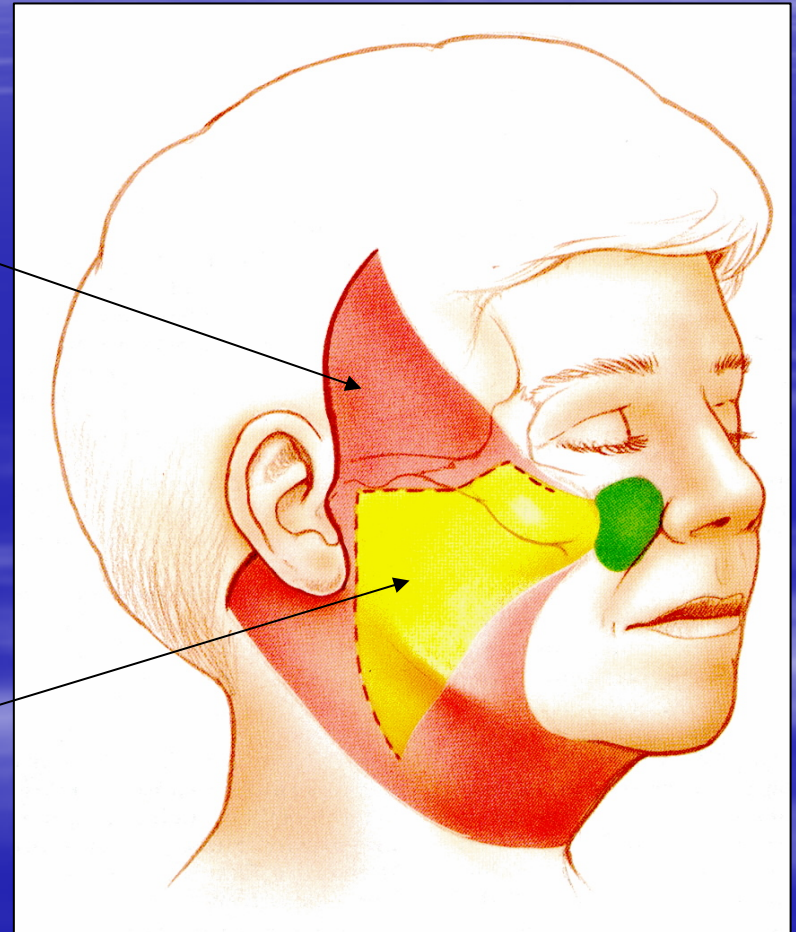


- SMAS  
imbrication



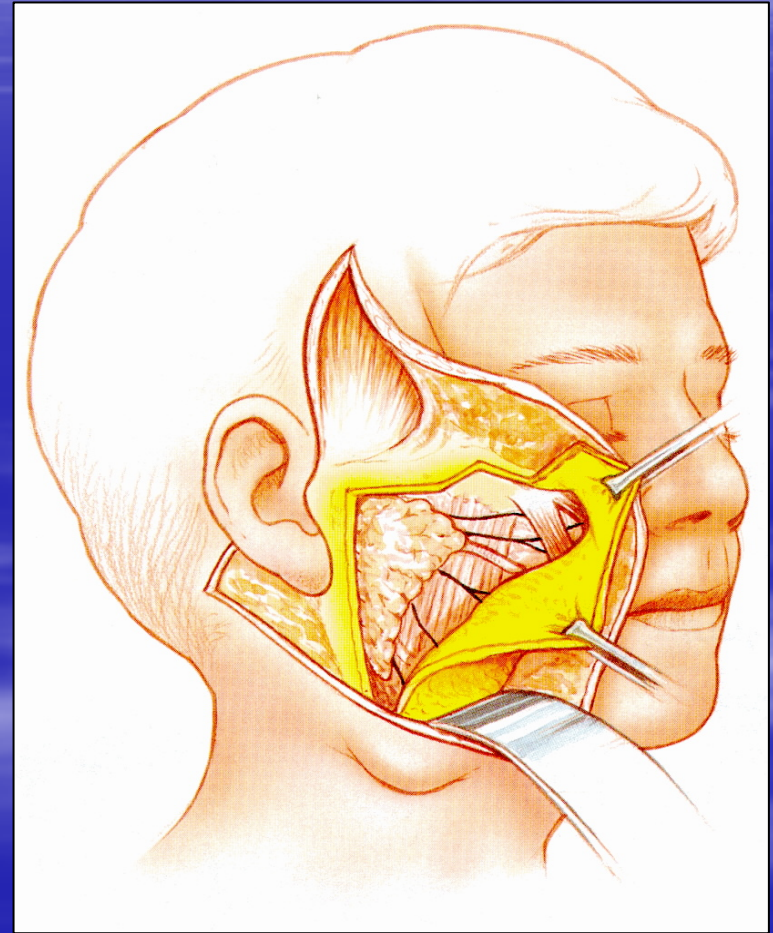
# Deep Plane Face Lift

- Red - Area of supra-SMAS undermining
- Yellow – Area of sub-SMAS undermining





- Borders of sub-SMAS dissection
  - Superior - orbicularis oculi and zygomaticus maj. and min.
  - Medial – ZM&M, NLF, buccal fat pad
  - Inferior – tail of parotid and masseter
  - Deep – parotidomasseteric fascia



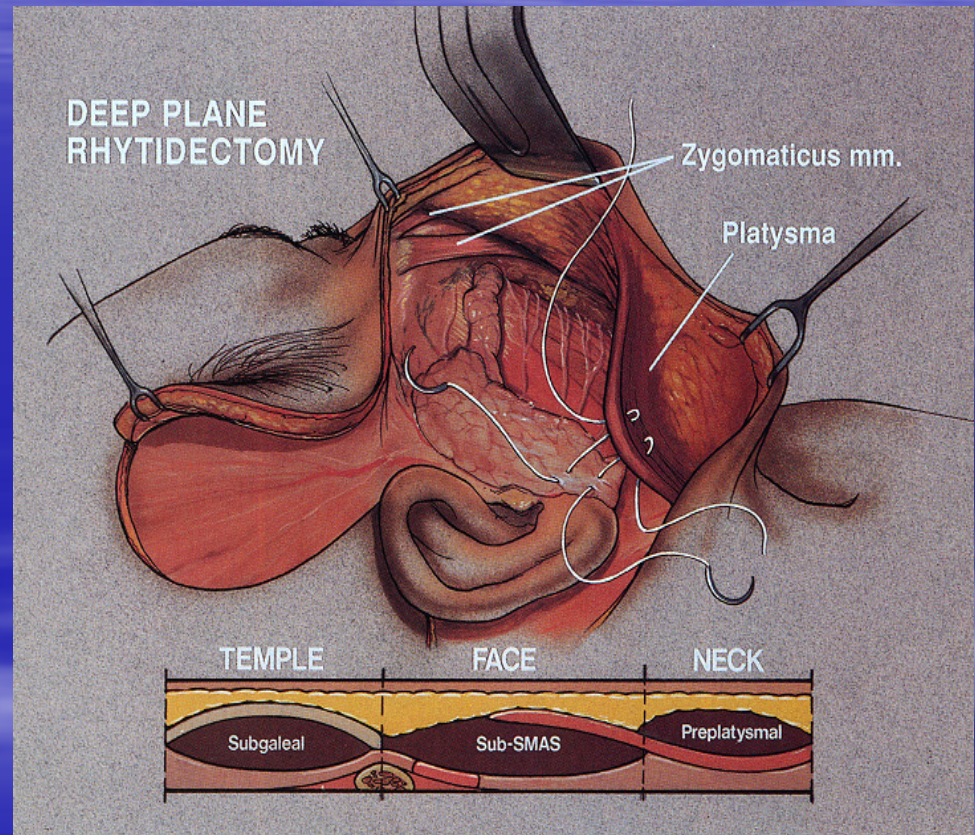
# Deep-plane lift

- Hamra in 1990
- improve the nasolabial fold area
- descent of the cheek fat is responsible for the increasing redundancy of the nasolabial fold with aging
- cheek fat has to be lifted from the zygomaticus major and minor muscles
- deep-plane facelift flap consists of skin, subcutaneous tissue, cheek fat and platysma



# Deep-plane lift

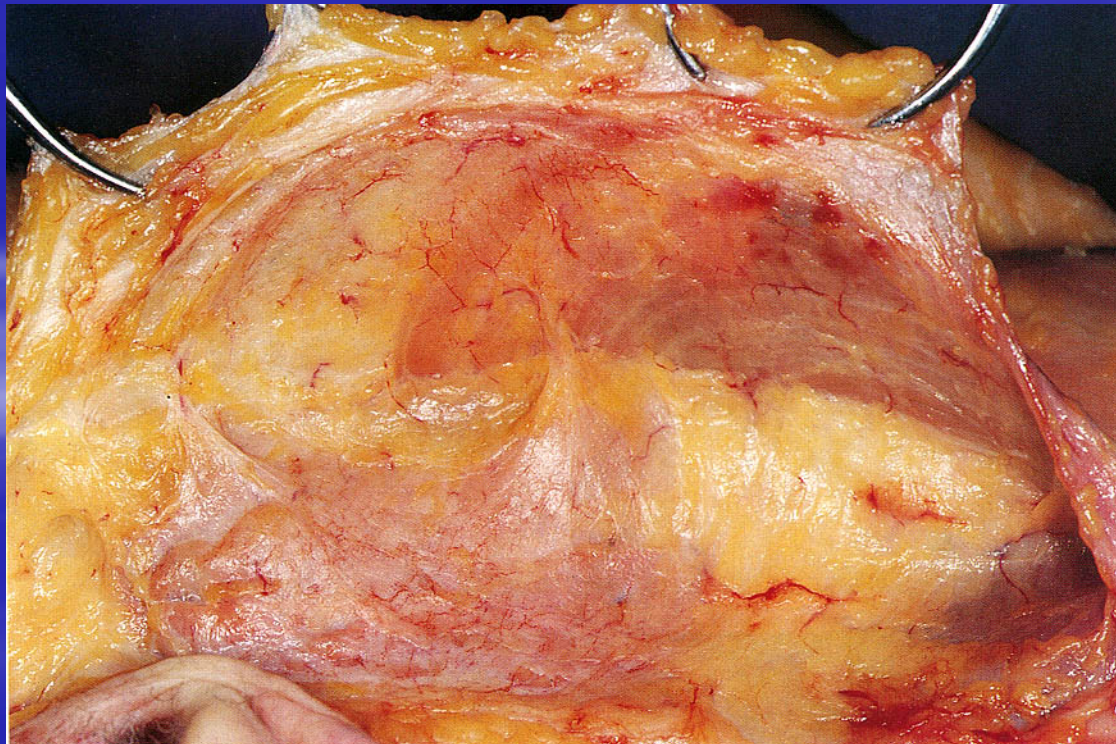
- limited subcutaneous dissection approximately 2-3 cm in front of the tragus
- SMAS is incised and sub-SMAS dissection from malar eminence to jawline
- changes to the level superficial to the zygomaticus musculature when the lateral edge of the zygomaticus major muscle is reached
- extends medial to the nasolabial fold





# Lateral Brow-Facial Nerve

- Inferior to zygoma facial nerve deep to SMAS, deep to OO
- Over zygoma close to periosteum, elevate SDTF

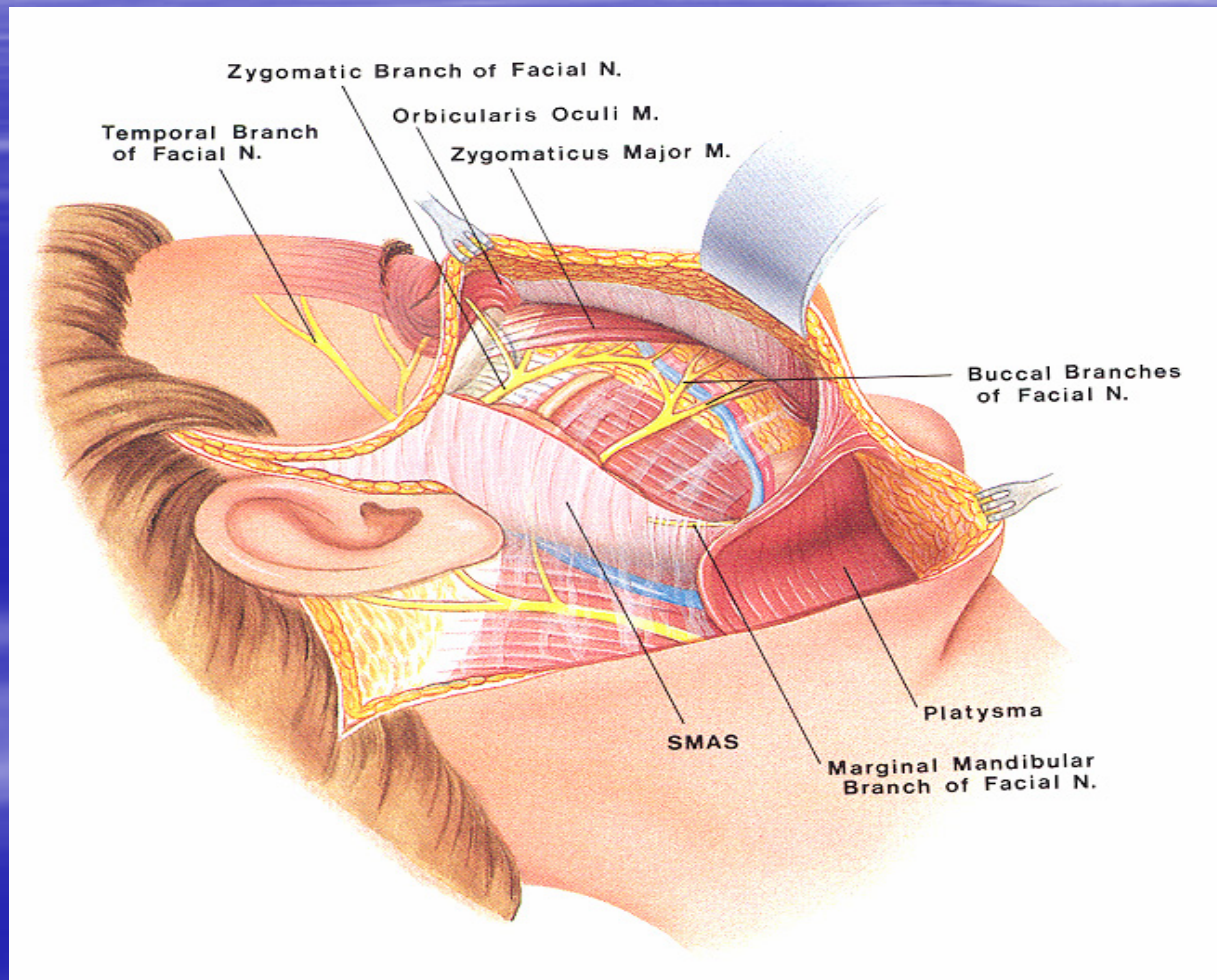


- Hamra (1990)

- Reported 403 patients who had deep-plane lift in 1990
- 4 patients with post-op hematoma of the neck requiring evacuation in the operating room
- 2 patients had pseudoparesis of the lower lip
- 2 patients had weakness of the upper lip
- All of them recovered within 6 weeks
- Advantage:
  - better address the nasolabial fold
  - traps the entire subcutaneous vascular system to give the result flap a more vigorous circulation
  - thicker flap also gives a greater tensile strength



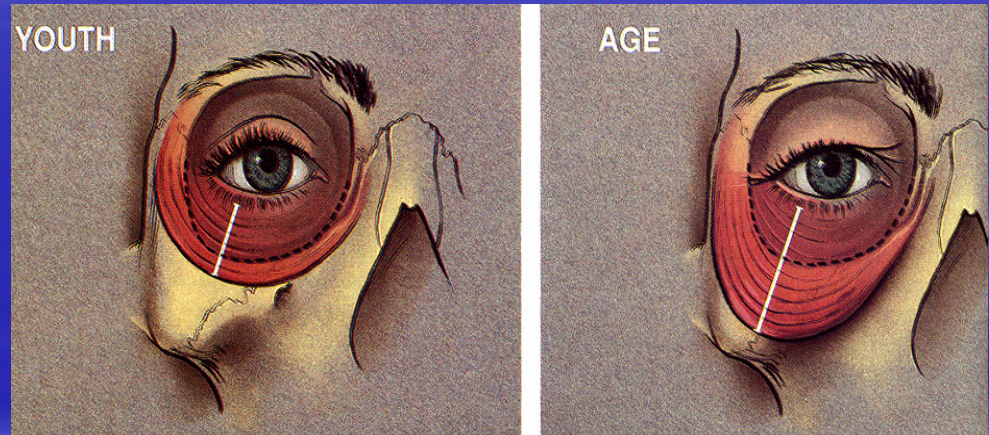
# Composite Face Lift



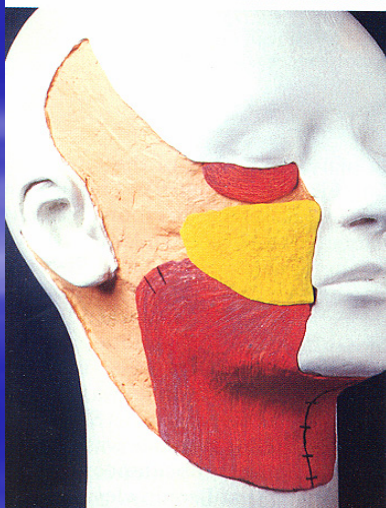


# Composite lift

- Hamra (1992)
  - based on the deep-plane rhytidectomy
  - intended to improve the inferiolateral descent of the orbicularis oculi
  - composite face lift flap consists of orbicularis, cheek fat and platysma en bloc

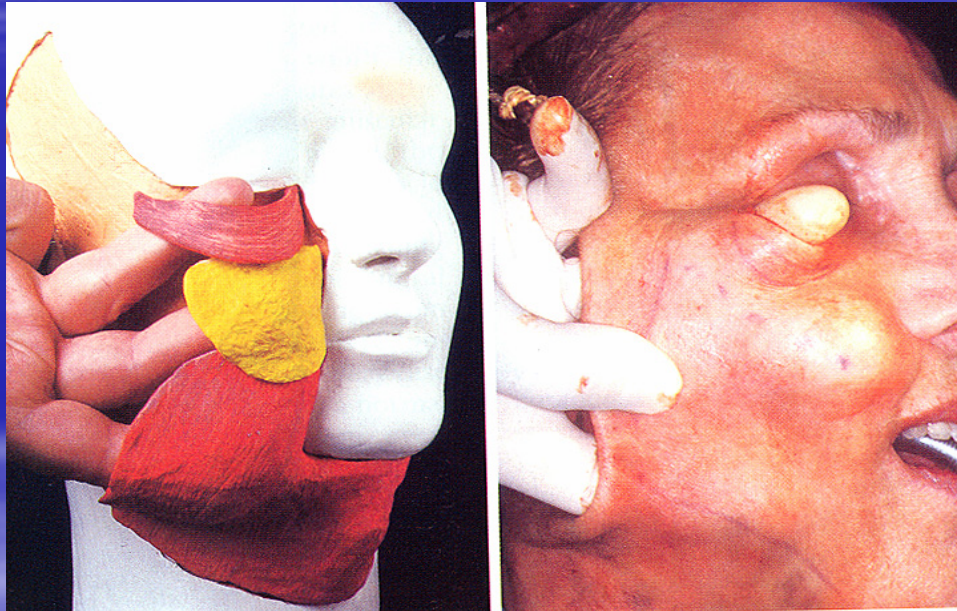


# Composite lift





# Composite lift



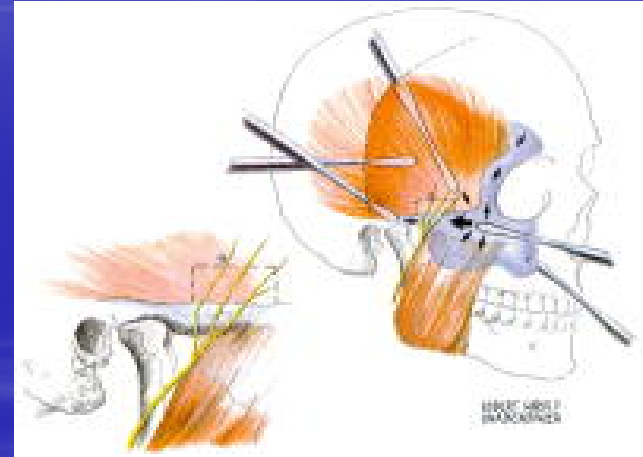


- Hamra (1992)

- 167 patients
- no nerve injury
- one patient had neck hematoma
- malar tenderness and edema may persist for several months
- repositioning in this technique must be done with extraordinary tension

# Subperiosteal lift

- first published by Psillakis in 1987
- revised by Ramirez in 1990
- superior displacement of the muscles
- approaches:
  - bicoronal, transtemporal, transoral, transorbital
  - open vs. endoscope
- Advantage:
  - Tension remains in deeper tissue and less tension on skin
  - Better preserved blood supply to the flap
  - Better correction of mid-face



# Subperiosteal lift

- Disadvantage:
  - Increased horizontal width of the face
  - greater swelling and ecchymosis
  - Nerve injury
    - Infraorbital nerve
    - Frontal branch of facial nerve injury
      - 105 patients by Psillakis
      - 4 out of their first 20 patients had temporary paralysis of the frontal branch



# Subperiosteal lift

- Ramirez (1990)
  - 28 patients
  - bicoronal incision
  - completely detach soft tissues from the zygomatic arch
  - no patient with nerve injury
  - facial edema which can take up to 6 weeks to resolve
  - mask effect which improves gradually over a 4-month period