

An anatomical illustration of the upper face, showing the skin, underlying muscles, and nerves. The illustration is in a cross-sectional view, highlighting the complex layers of tissue. The muscles are shown in shades of red and pink, while the nerves are depicted in yellow and blue. The background is a light beige color, representing the underlying bone structure.

# Injection Anatomy Of The Upper Face

Dr Ryan Hamdy MB ChB

For Our  
Purposes

Forehead and Glabella

Temple Region

Periorbital Region

# Overview

Demand for non-surgical procedures is rapidly expanding

In addition our procedures are becoming increasingly more complex

Neurotoxin and HA Fillers have an excellent safety profile

We are becoming increasingly aware of the potential for serious and life changing complications

As a result we are obliged to have a thorough understanding of the underlying anatomy of the face

# What is Injection Anatomy?

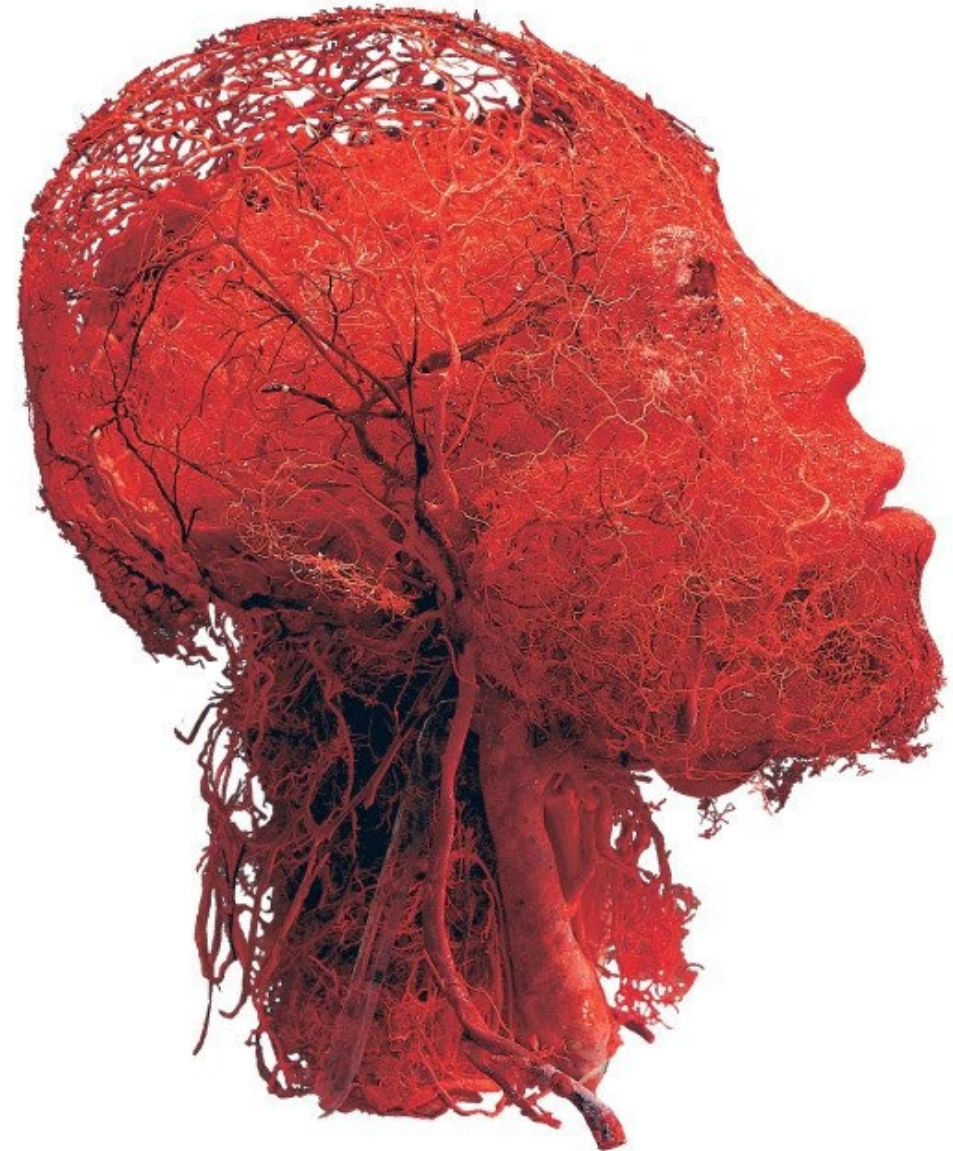
Injection Anatomy can be defined as the anatomical study of regional surface landmarks and the underlying DEPTH of the target tissue and vital structures

All anatomy textbooks will give an average 2D picture. However we are aware of the vast variability in individual anatomy

What is much more predictable is the consistency in the depth at which vessels pass through tissue

The Face is full of  
blood vessels  
Who would want  
to inject into this !

---



But of course  
we all do.  
So the  
important  
thing is to  
make sure  
that

We are away from the vessels

Inject above

Inject below

Clearly we need to be aware of  
the depth of your needle tip

# Vascular Occlusion

Result of Intravascular deposition of filler and subsequent embolization

Arterial resulting in necrosis and possible blindness

Venous, although emboli in the venous system are usually filtered out by the pulmonary arterial system

Filler product can travel significant distances which is why cases of blindness have been reported from primary injections anywhere on the face

# Vascular Occlusion

In every case examined histologically filler has been found in the lumen of the artery

Common misconception that filler around an artery can cause pressure occlusion

Compartment syndrome does not occur on the face



# Vascular Occlusion

If the pressure on the plunger exceeds systolic pressure the product will flow in the direction of least resistance- which may be against the normal flow in that vessel

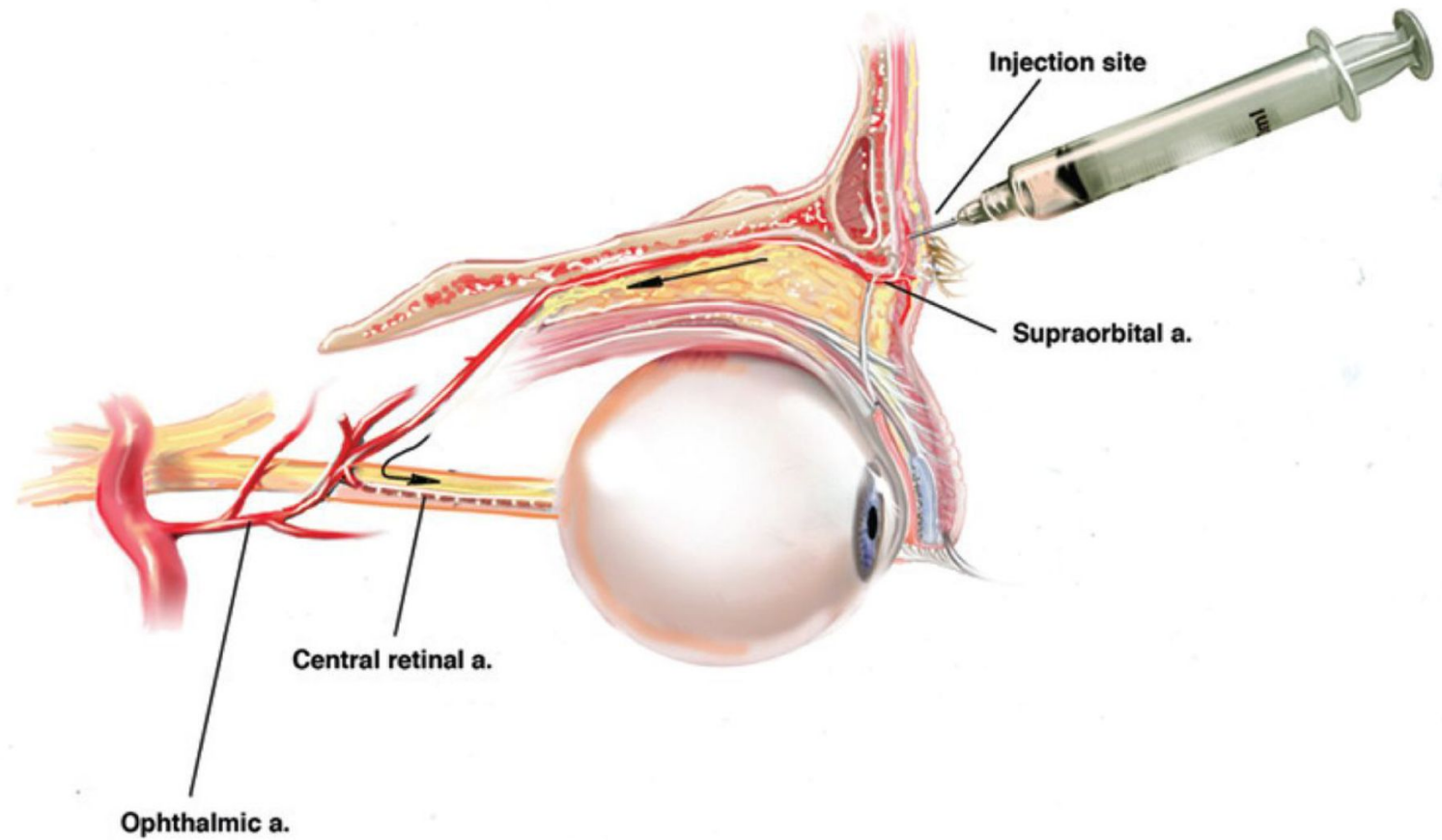
When the plunger is released the product will flow in the direction of blood flow again.

Possible that the product is no longer where you injected and can flow forwards clogging distal vessels

Therefore any delayed complaint of a 'bruise' or colour change away from the injection site should be reviewed

Pathogenesis  
of Filler  
Related  
Blindness

Retrograde Flow / Blindness



# Tips To Avoid Intravascular Injection 1

Understand anatomy and potential danger areas

Aspirate-remains controversial. False negatives

Inject slowly with minimum pressure

Small aliquots

Move tip of needle-controversial

Small needle-controversial

Use cannula

## Tips To Avoid Intravascular Injection 2

Adding a vasoconstrictor in the product or before injection-controversial

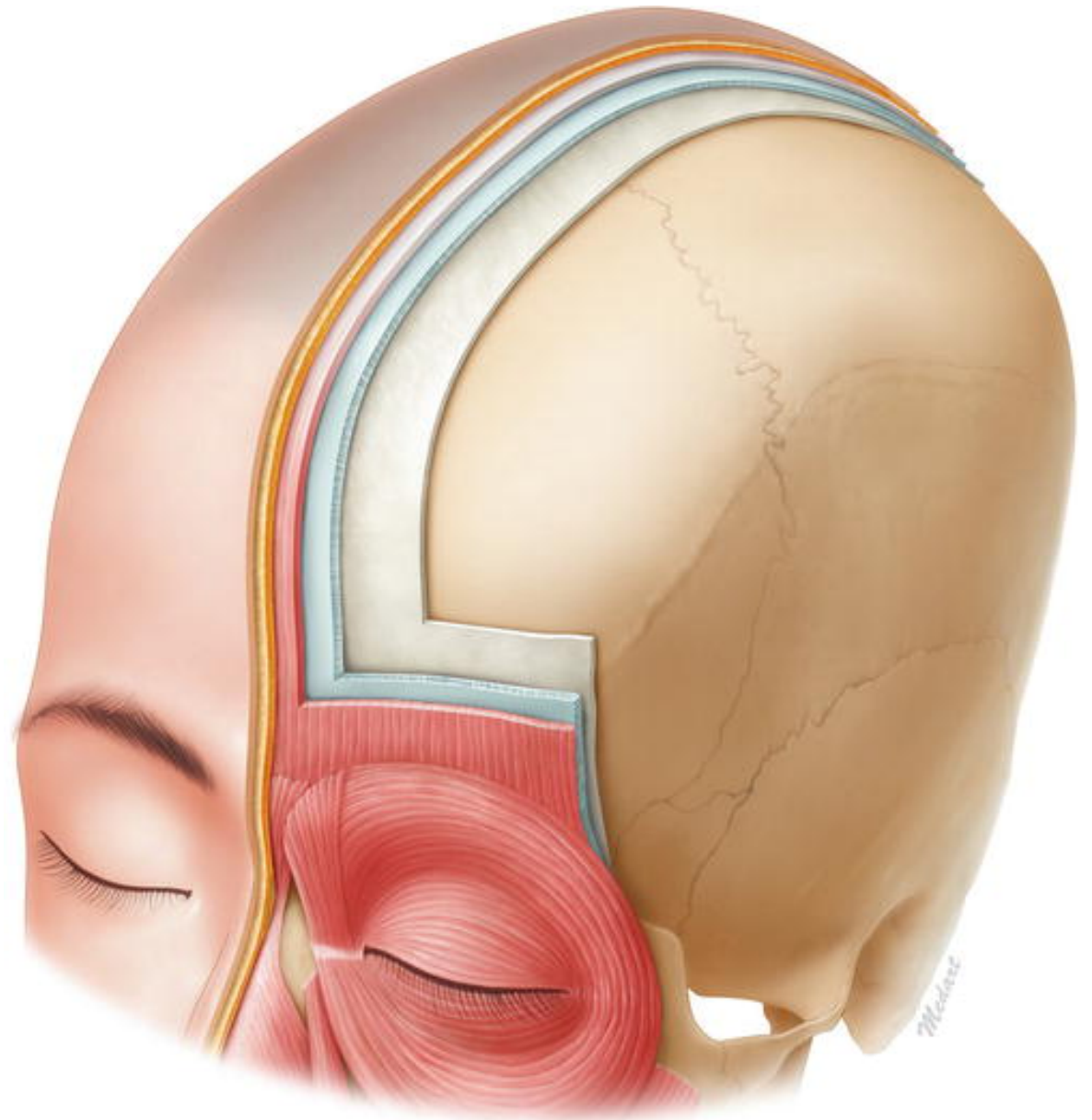
Maybe avoid filler with lidocaine (vasodilator)

Patients who have undergone previous surgery are at increased risk

Always watch the skin and not the syringe

# Forehead and Glabella

---



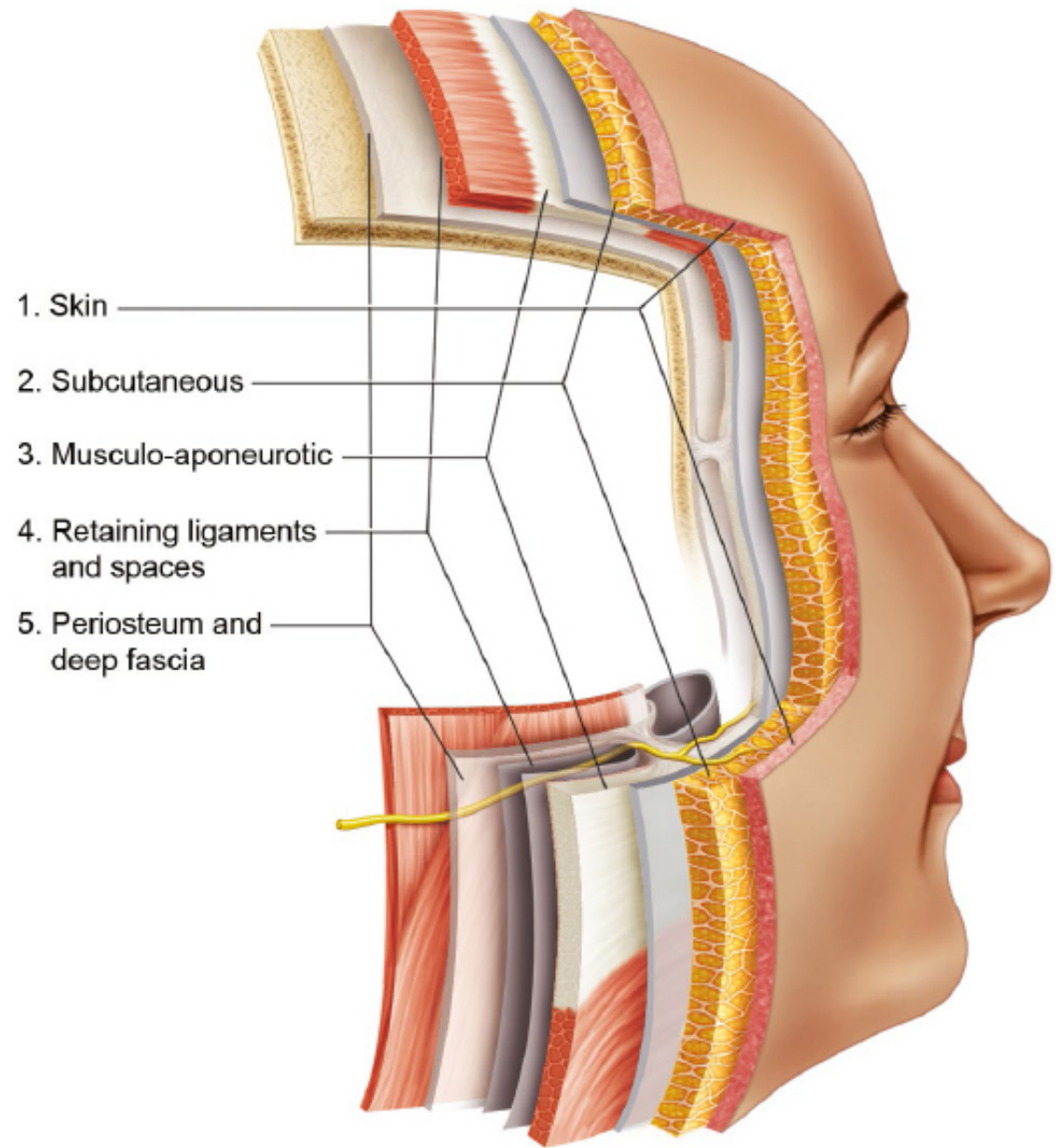
## Anatomical Boundaries

Eyebrows and nasal root  
inferiorly

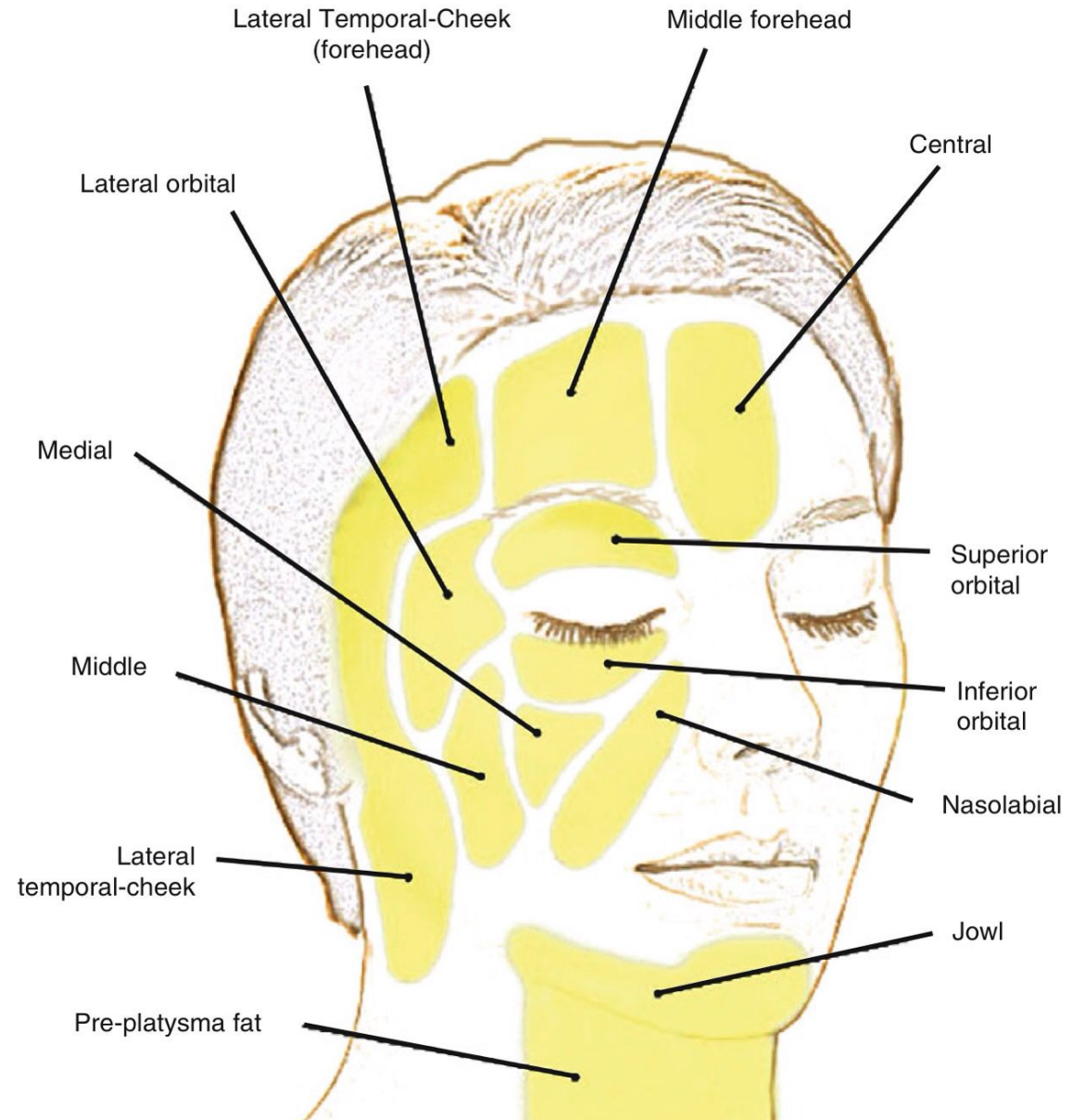
Temporal fusion lines laterally

Upper hairline ( upper end of  
frontalis contraction) superiorly

# Layers of The Forehead Region

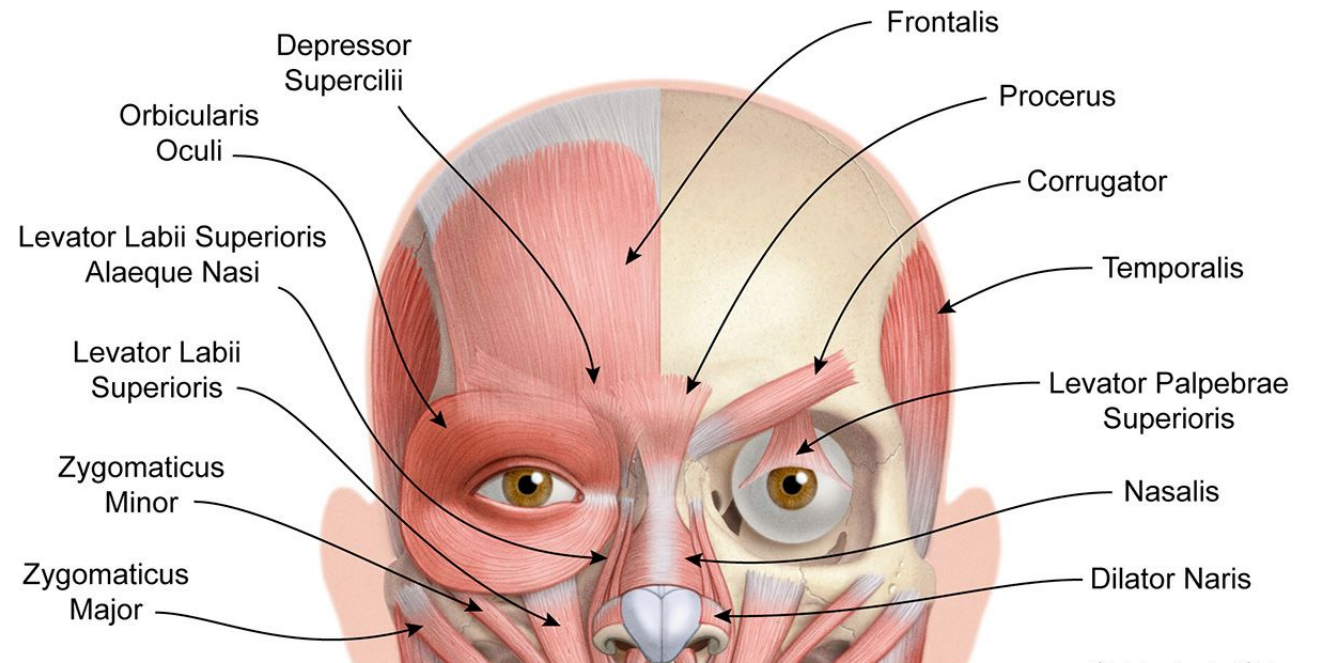


# Fat Pads of Forehead

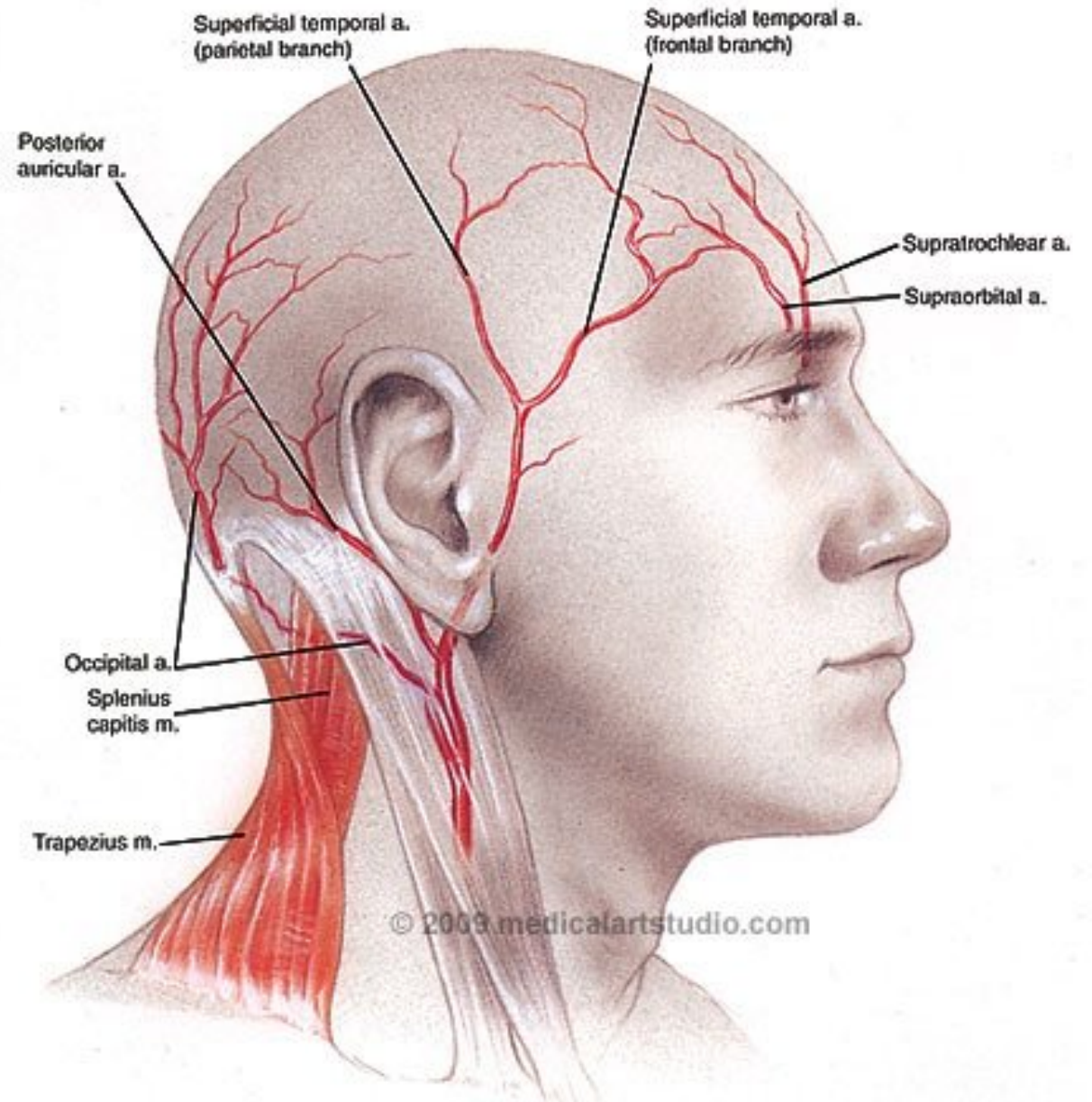




# Muscles of Forehead



# Blood Supply to Forehead



# Blood Supply to Forehead

Supraorbital Artery (SO)

Supratrochlear Artery (SA)

Anterior branch of Superficial Temporal (ST)

These arteries often anastomose on the forehead creating a direct route between to internal and external carotid systems

# Blood Supply to Forehead

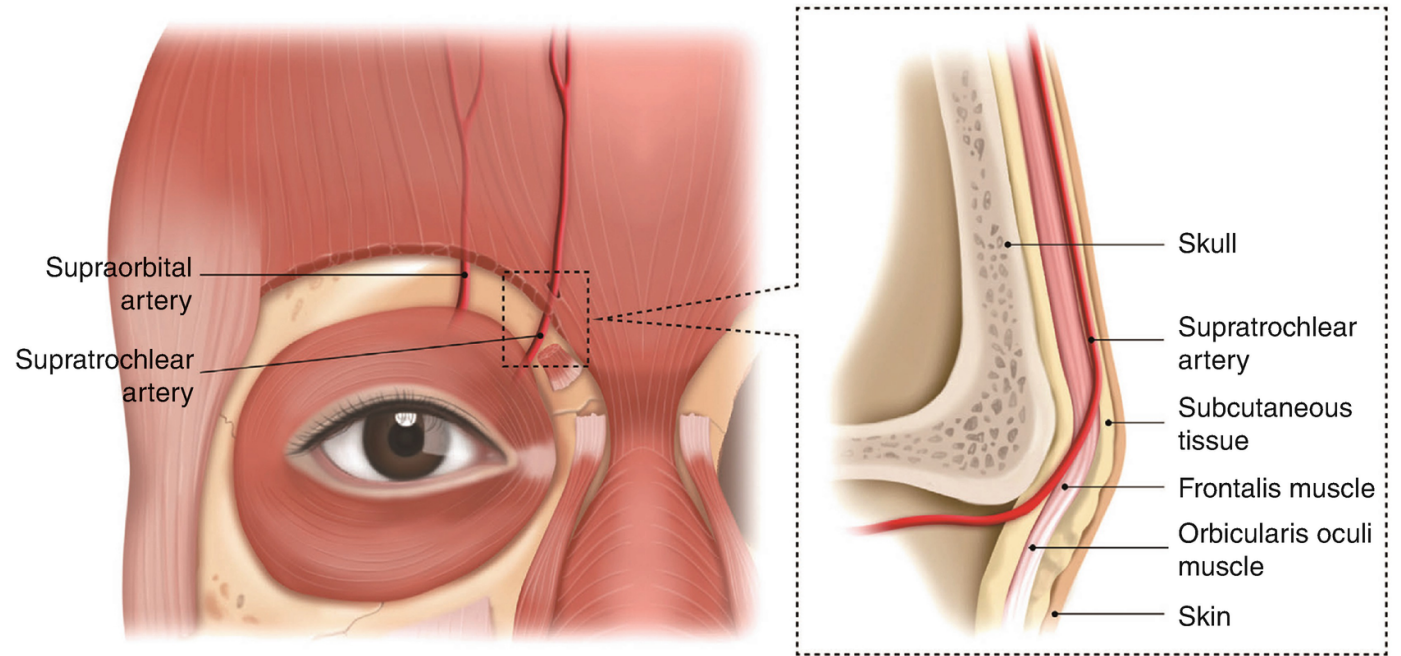
The SO and ST exit the orbit on the supraorbital rim

The SO is typically found emerging from a notch (80%) of small foramen (20%) at the medial iris line

The ST is a little more variable emerging between 8-12mm medial to the SO. This topographically can be located beneath or 2mm lateral to the medial crease of corrugator

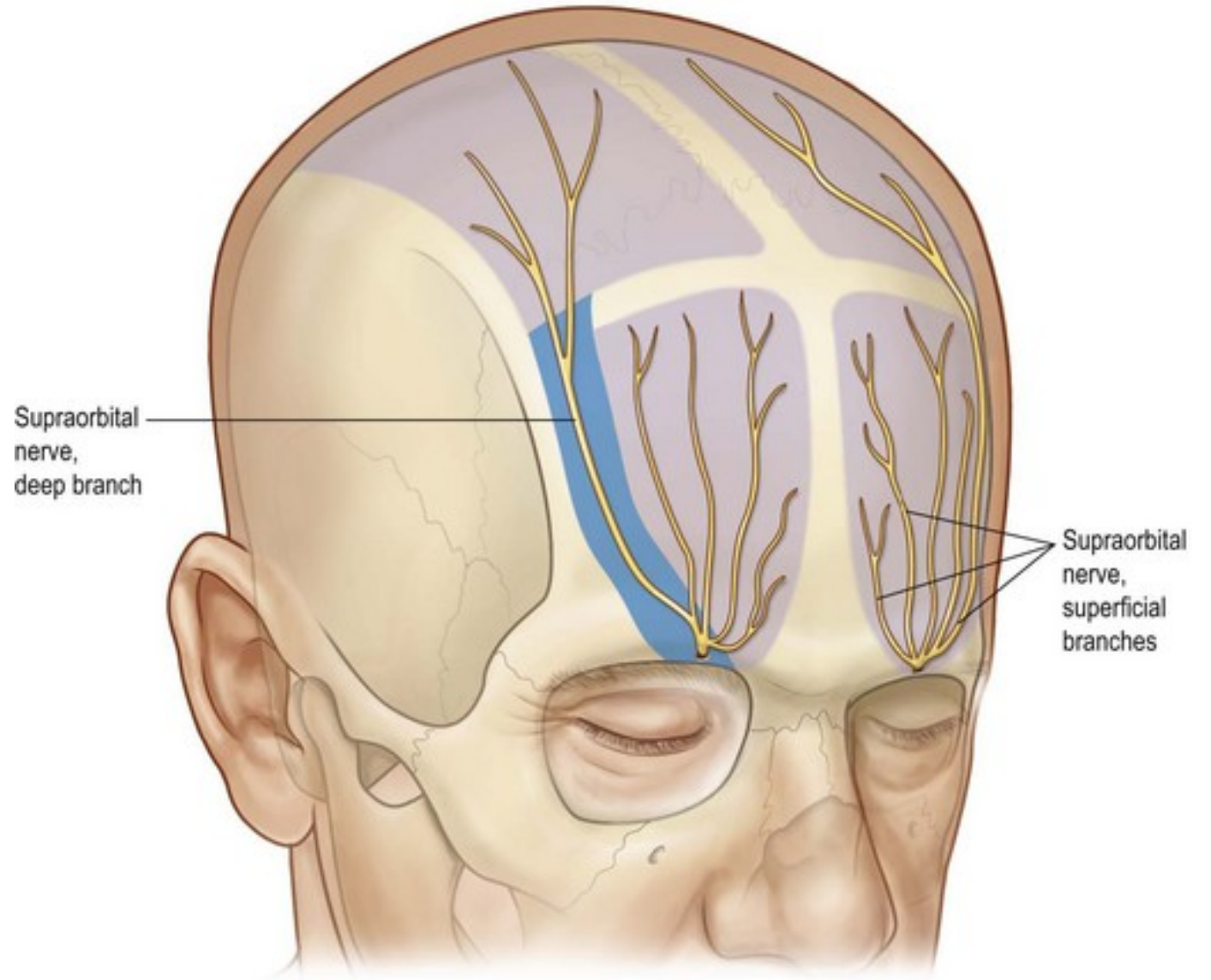
Within 1.5cm both arteries pierce the galea becoming more superficial supplying the muscle and skin of the forehead

# Blood Supply to the Forehead



# Nerve Supply to the Forehead

- Branches of the Facial provide motor supply
- Sensory supply is provided by branches of the supratrochlear nerve and supraorbital nerve, both of which follow the associated arteries except for the deep branch of the supraorbital nerve



# Treatment of the Forehead and Glabella

Traditionally this area has been largely treated with Neurotoxin

The ageing process with loss of volume, brow descent results in increasing concavity and hyperactivity of the surrounding muscles

The upper face is often neglected when it comes to volume replacement

Technically more challenging to treat with dermal fillers and the risks of significant complications are higher

# Neurotoxin Injection to Forehead and Glabella

Most complications are Injector related

Fortunately all complications are self limiting

An understanding of dynamic facial movement is key

As is correct patient selection

DEMO



# Dermal Filler Injections to Forehead and Glabella

This is associated with a high rate of complications

Use of filler in the glabella region accounts for the majority of cases of blindness caused by temporary fillers

It also accounts for nearly 50% of all cases of tissue necrosis. As a result I NO Longer inject this area with fillers.

Injection of the forehead with filler is technically challenging.

# Dermal Filler Injections to Forehead and Glabella

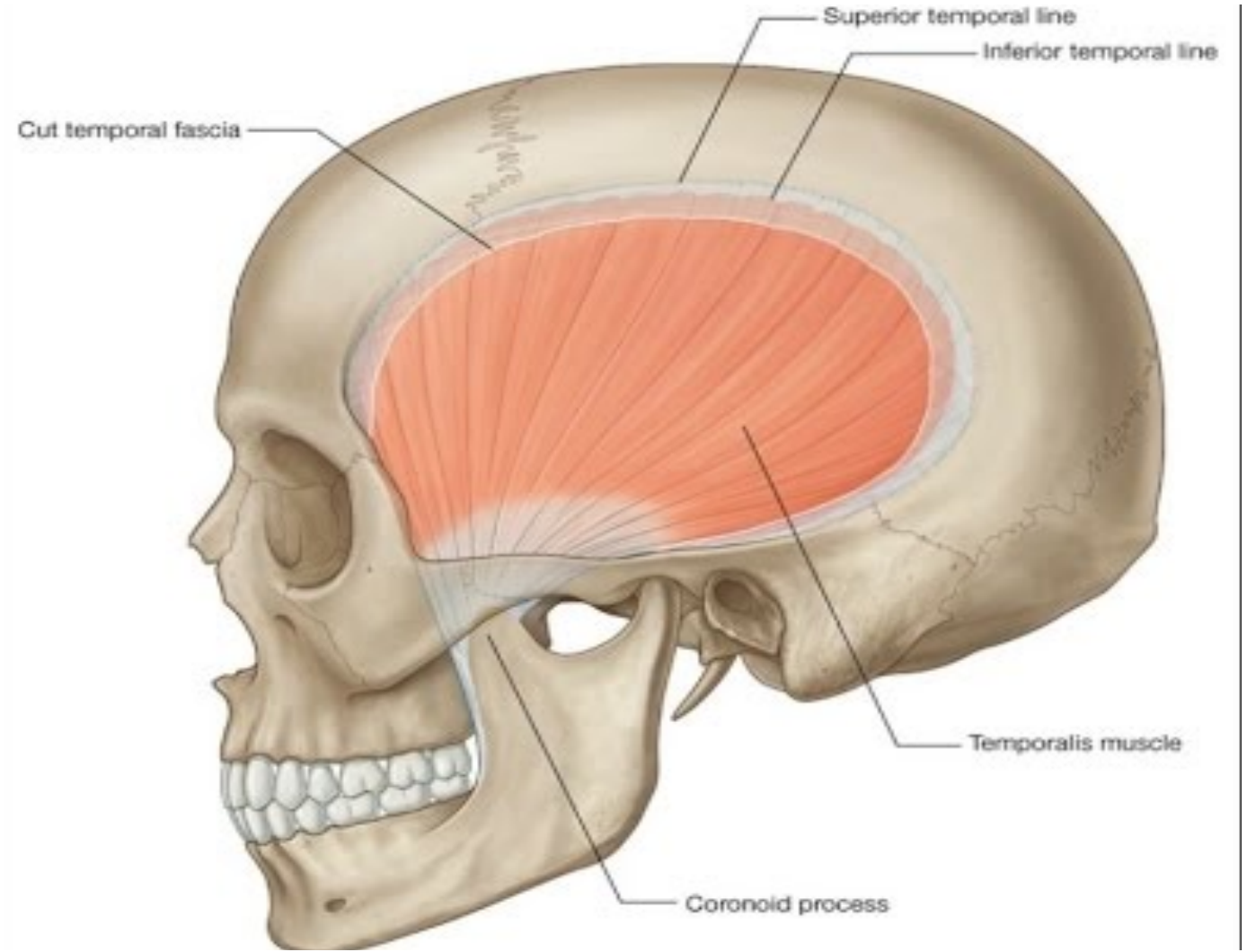
Traditionally we have injected the forehead superficially (intradermally) with low G prime filler to erase fine lines and wrinkles

However we are aware that volume replacement is now key to restoring convexity and light reflection so deep supra-periosteal injections are now recommended

Remember the SO and ST are superficial arteries in the forehead, so with this in mind ensure you needle or cannula are on the bone in the sub galea plane

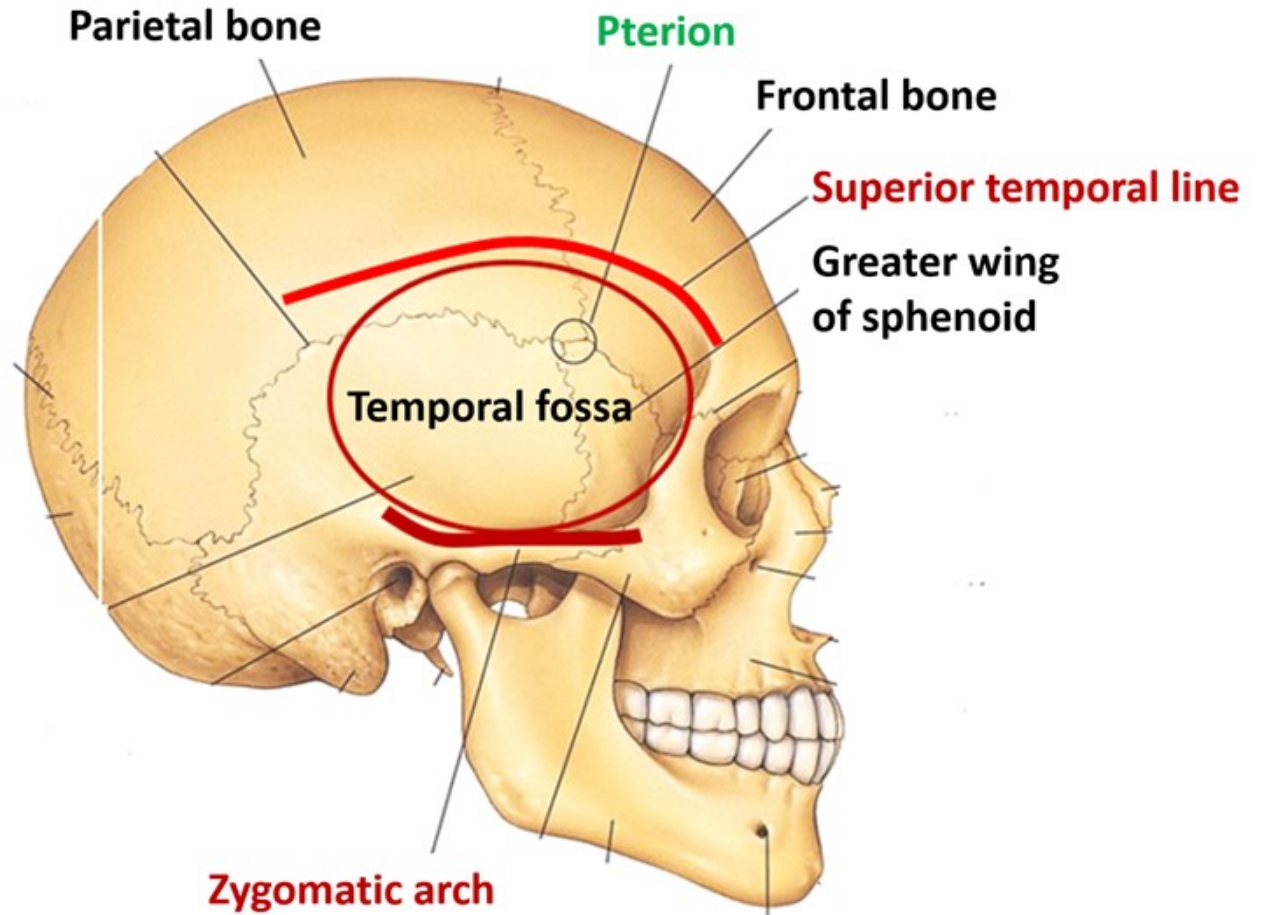
# Temple Region

---



# Anatomical Boundaries

- The temporal region or fossa is the shallow depression on the lateral side of the head which houses the temporalis muscle
- The Superior Temporal Line forms its superior border
- The upper border of the Zygomatic Arch forms the inferior border
- Four skull bones form the floor
- Skin and temporal fascia form the roof



# Temporalis Muscle

Temporalis muscle is main muscle of mastication. Broad fan shaped muscle on each side of the head that fills the temporal fossa. It passes beneath the zygomatic arch forming a tendon that inserts into the coronoid process and ramus of the mandible

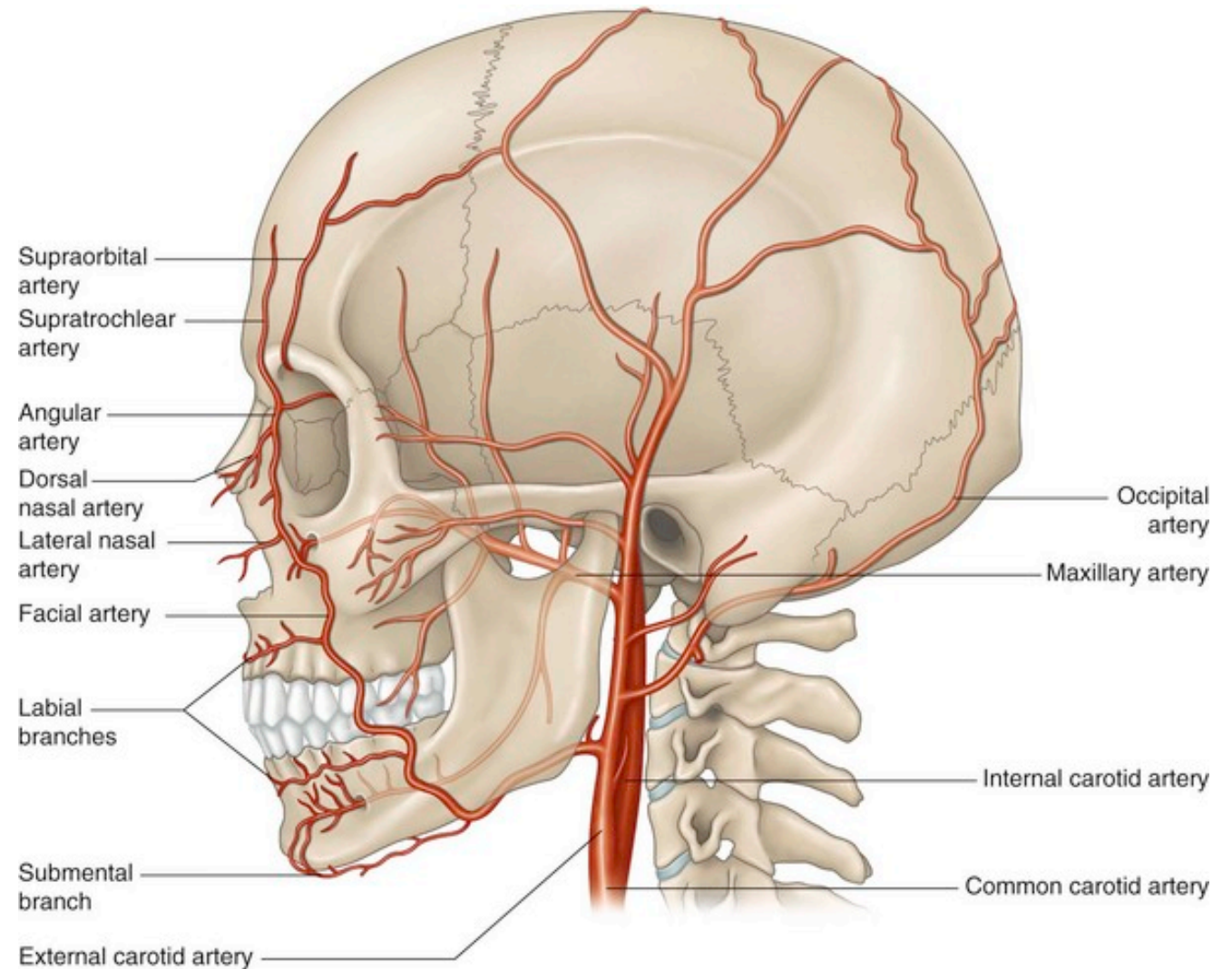
It originates from the floor of the fossa and is very adherent to the bone

Its upper border is delineated by the superior temporal line

The muscle is covered by the deep temporal fascia which is a continuation of the periosteum of the scalp

## Blood Supply to the Temporal Muscle

- This comes from the middle temporal artery—a deep branch of the superficial temporal artery
- Also from the deep temporal arteries—which are branches of the maxillary artery ( which is a terminal branch of the superficial artery)



# Superficial Temporal Artery

The superficial temporal artery is one of the most important arteries of the head and scalp

It is a terminal branch of the external carotid artery

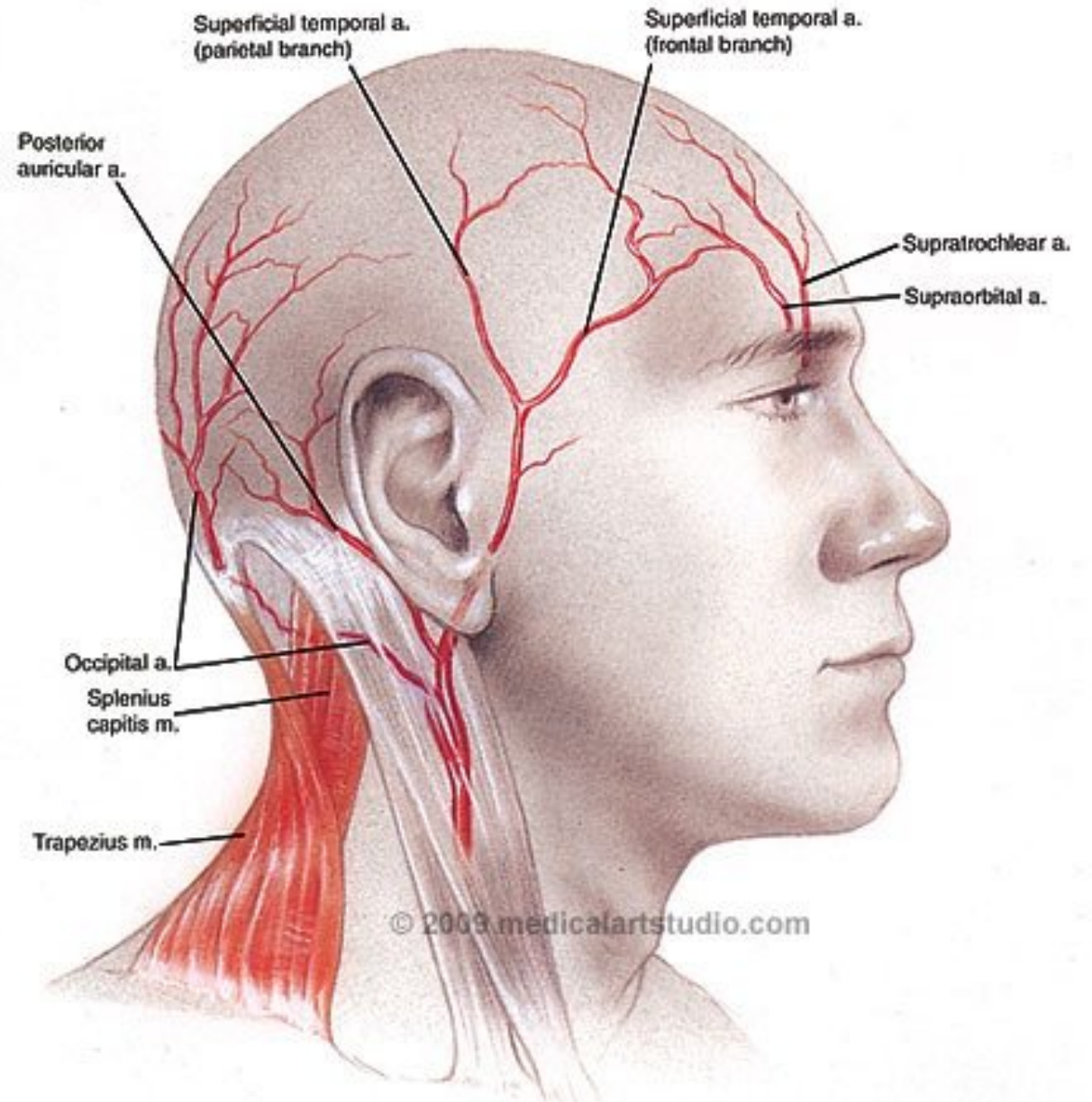
Emerges from the body of the parotid and crosses over the lateral root of the zygomatic arch

About 5 cm above this it divides into an anterior branch and parietal branch supplying the skin of the scalp

Generally runs anterior to the hair line in the superficial temporal fossa and then anastomoses with branches of the supratrochlear and supraorbital arteries

# Superficial Temporal Artery

---





# Nerve Supply to the Temporal Fossa

Sensory supply-Deep Temporal Nerves which are branches of the mandibular division of the Trigeminal nerve

Motor Supply-Temporal branches of the Facial Nerve

Whilst this is important it is very rarely clinically relevant to dermal filler injections.

# Layers of the Temporal Fossa

Skin

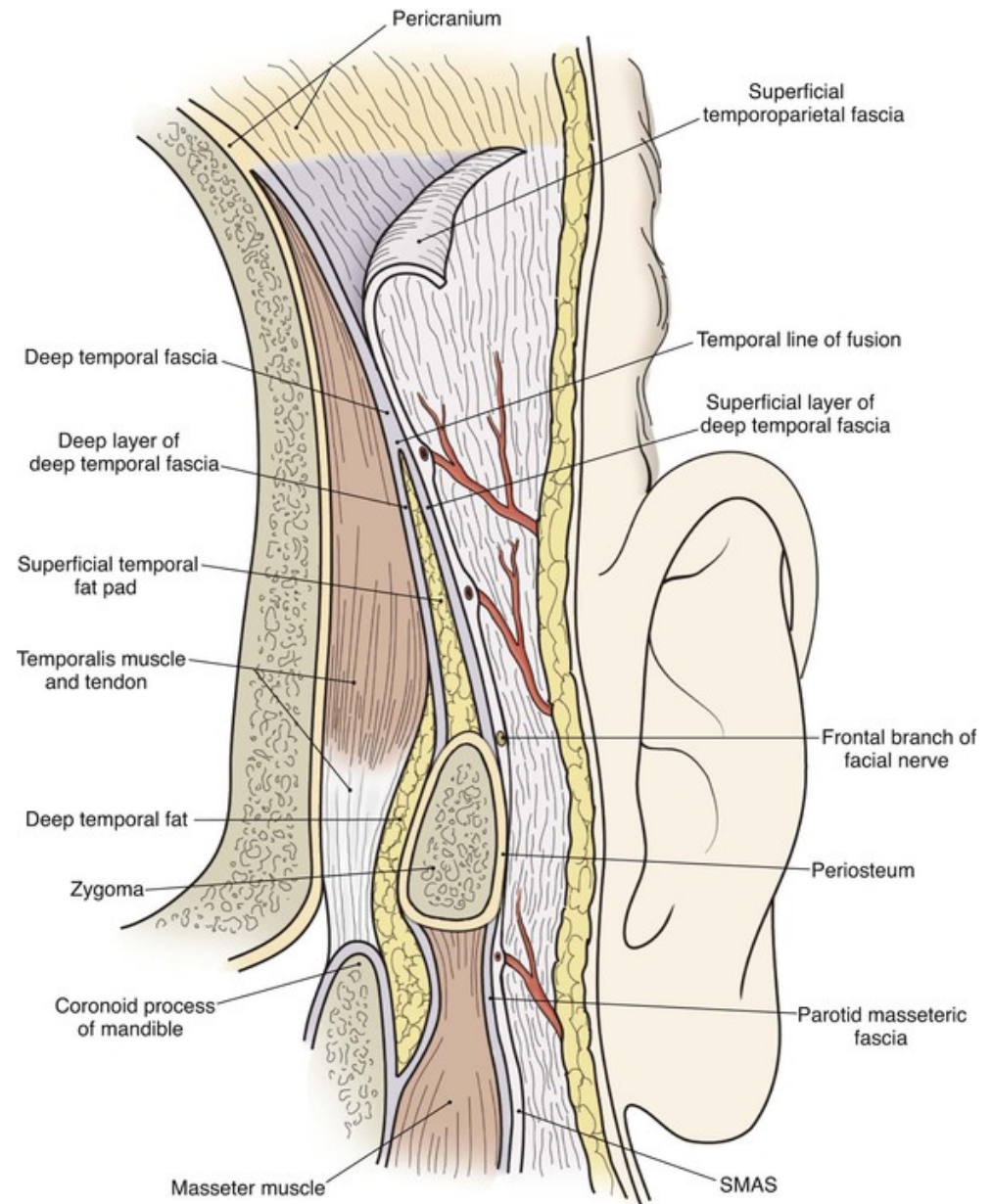
Subcutaneous fat

Superficial Temporal fascia-in which the superficial arteries and nerves run-this is continuous with the galea on scalp and SMAS lower down

Deep Temporal Fascia-this is continuous with the periosteum of the scalp and parotid fascia lower down

Bone and Periosteum

# Layers of the Temporal Fossa



# Treatment of the Temple

Volumizing of the temporal region helps to restore width to the upper face and aids in support of the lateral brow

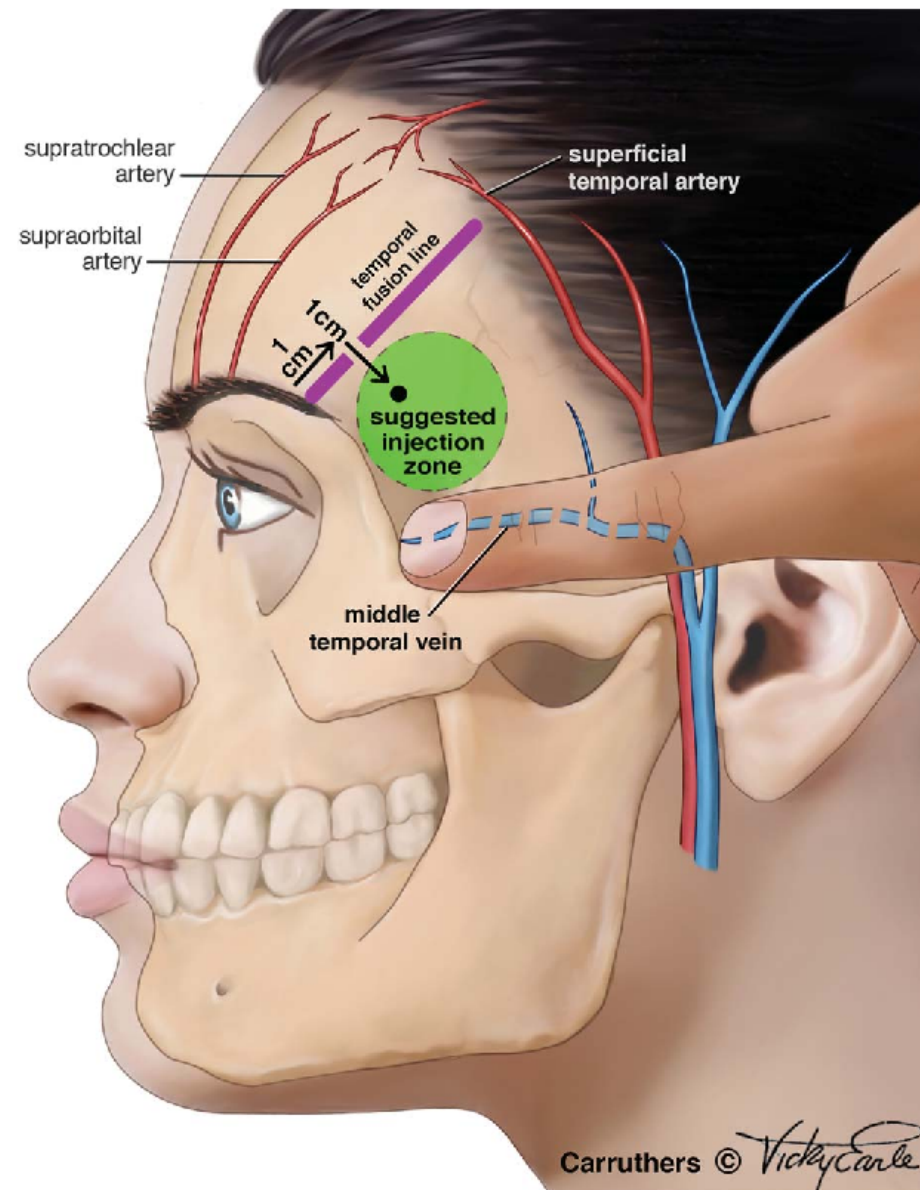
Imagine the temporal fossa to be like a swimming pool. We have a deep end and a shallow end

When we inject deep use a needle. This must be on the bone. Aspirate, keep the needle tip on the bone and inject slowly. Using the Arthur Swift Method (see next slide). Always palpate the STA and protect the hairline. This also prevents posterior migration of filler

When injecting in the shallow end-use a cannula (min.25G, pref. 22G). Note the proximity of the vessels in the superficial fascia

# Treatment of the Temple

---



**Figure 1** Suggested safe injection zone for the temple lies

# Treatment of the Temple

When injecting deep use a high G prime product to tent the deep temporal fascia. Use 0.5-1ml of product per temple. Inject slowly

When injecting superficially use a mid G prime product. Use a cannula only

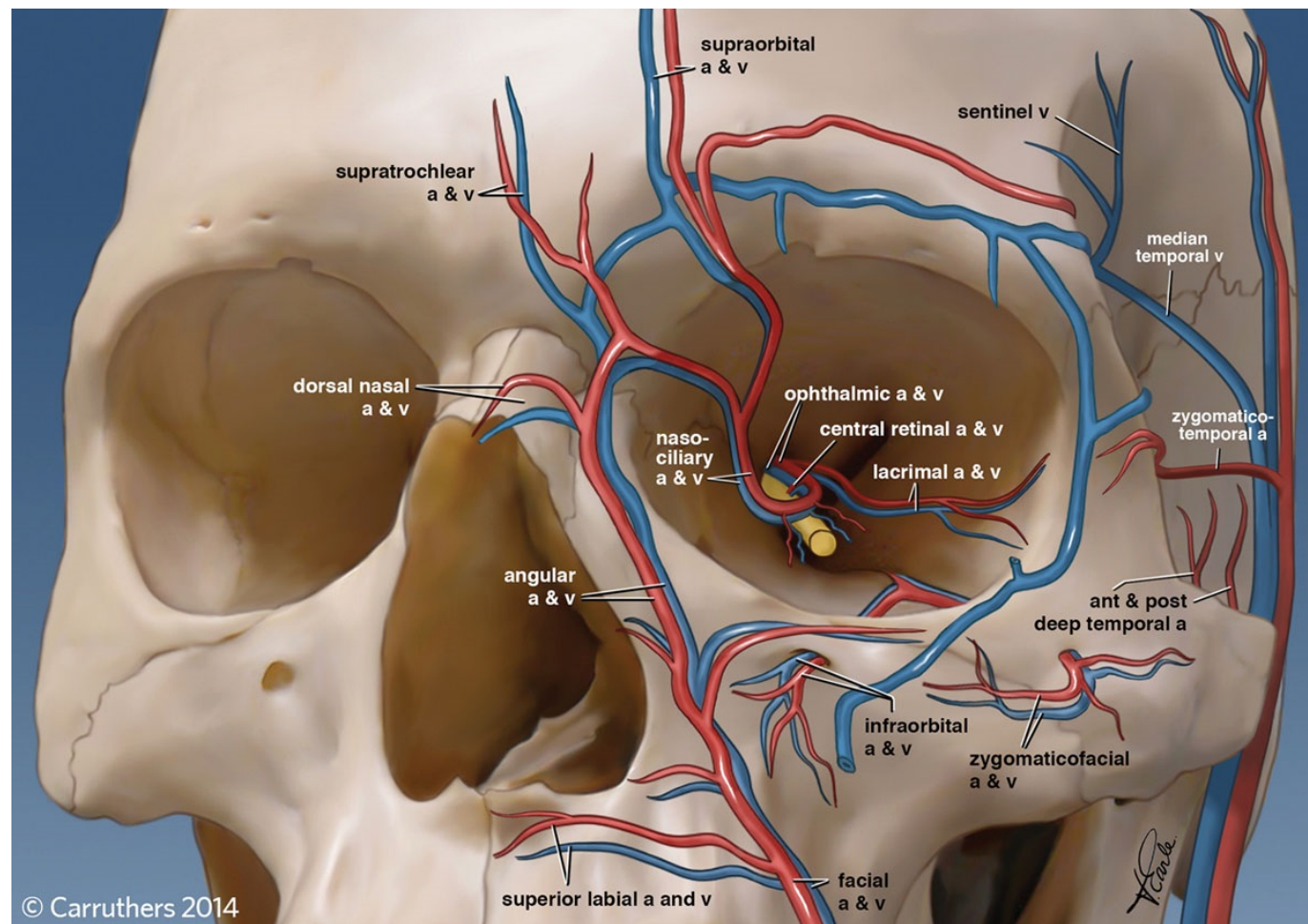
The patient may complain about some jaw ache after

There may also be some prominent veins for a week or so as well

There have been cases report of intracranial penetration with a needle. Particularly lower down in the temple

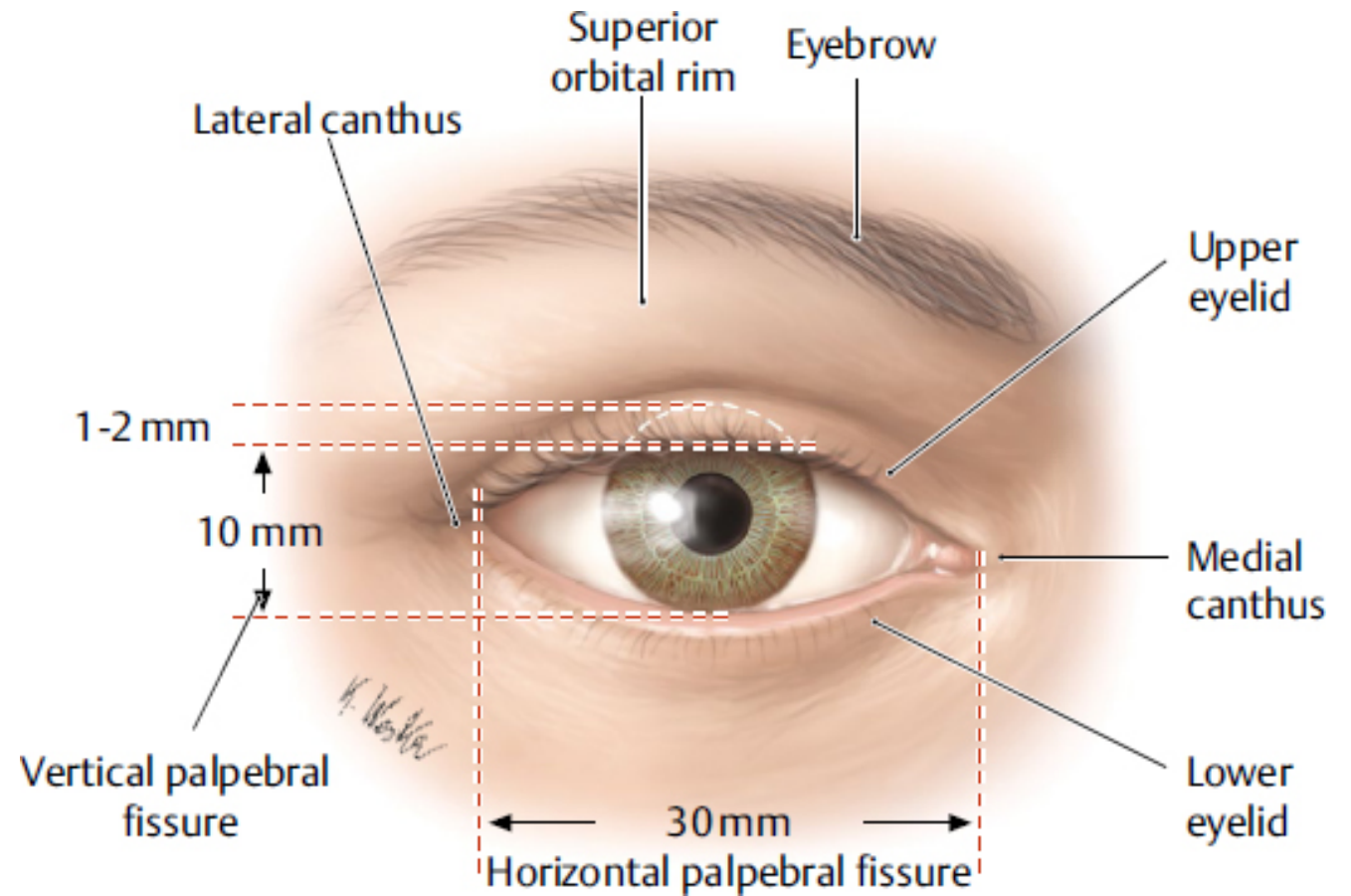
# Periorbital Region

---



## Periorbital Complex consists of

- Eyebrow
- The supraorbital rim and infra-brow
- Upper eyelid
- Lateral and Medial canthus with 5-10 degree tilt
- Lower eyelid
- Infra-orbital rim and upper cheek





# Ideal Contours should exhibit

Even fat distribution along the full length of the brow obscuring the supraorbital rim

Upper lid fullness should follow the contour of the upper lash line

Mild convexity of the lower lid with a short vertical height

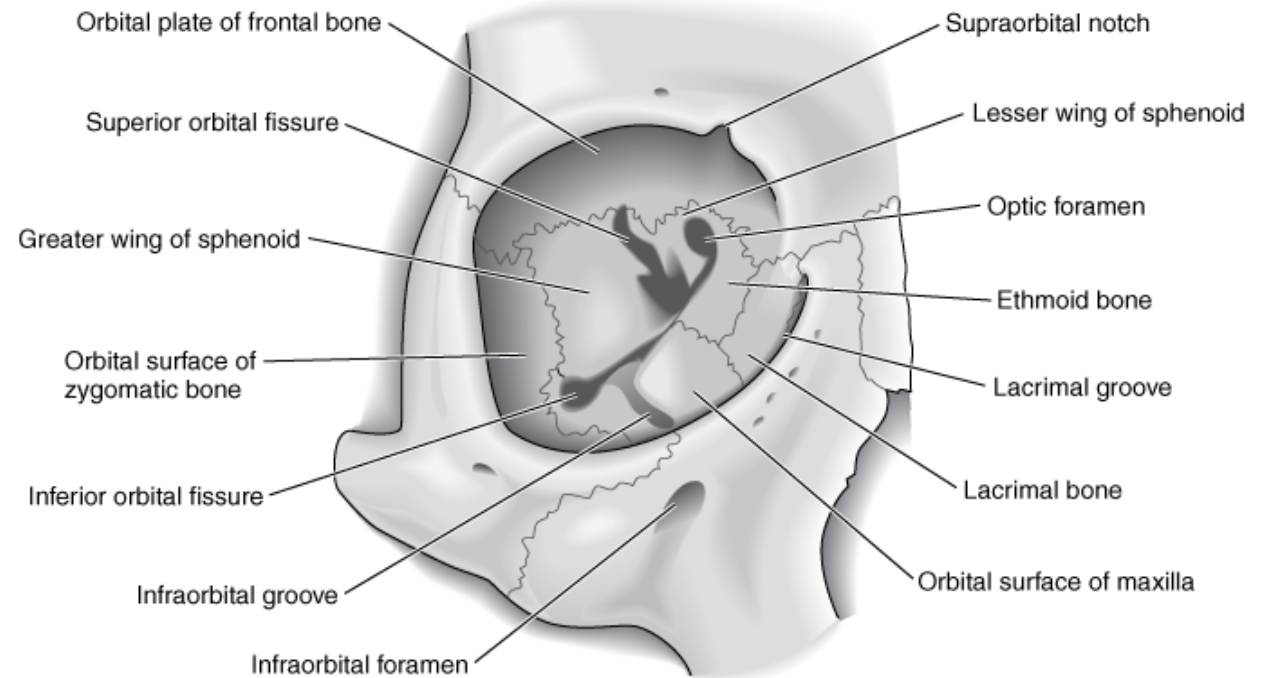
Fullness of fat obscuring the infraorbital rim

Lateral canthal region should show a mild smooth concavity showing no bony rim

Minimal lower scleral show

# Tear Trough

- Often referred to as a deformity but can be apparent in childhood
- So perhaps we can redefine these as the revealing of underlying periorbital anatomy/bony structure



Source: Riordan-Eva P, Cunningham E: *Vaughan & Asbury's General Ophthalmology*, 18th Edition: <http://www.accessmedicine.com>

Copyright © The McGraw-Hill Companies, Inc. All rights reserved.

# Predisposing factors for Tear Trough

Genetics

Descent of cheek fat medially and anteriorly

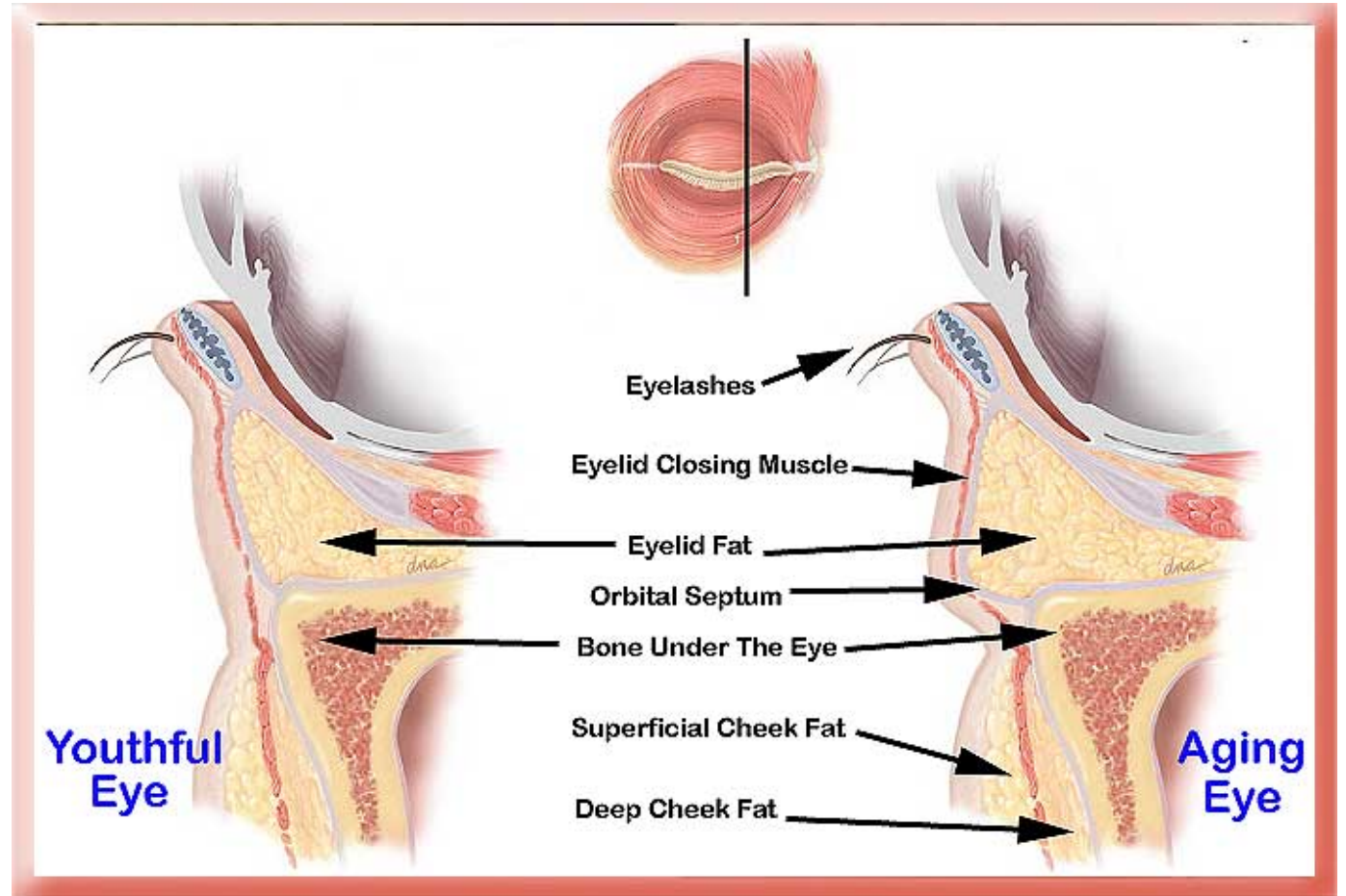
Loss of volume of malar complex

Skin laxity

Descent of the globe and anterior projection of infraorbital fat

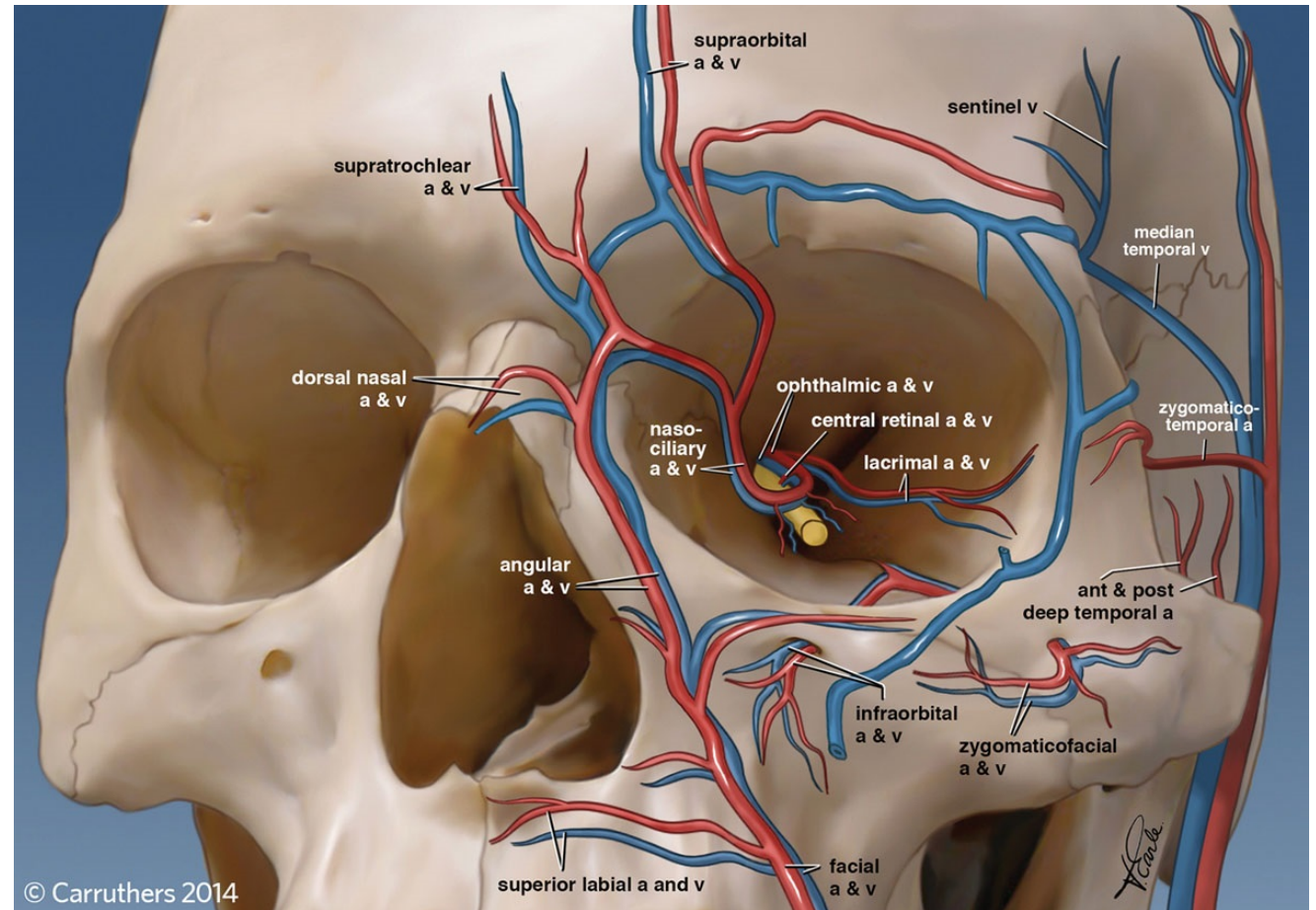
# Anatomy of Tear Trough

---



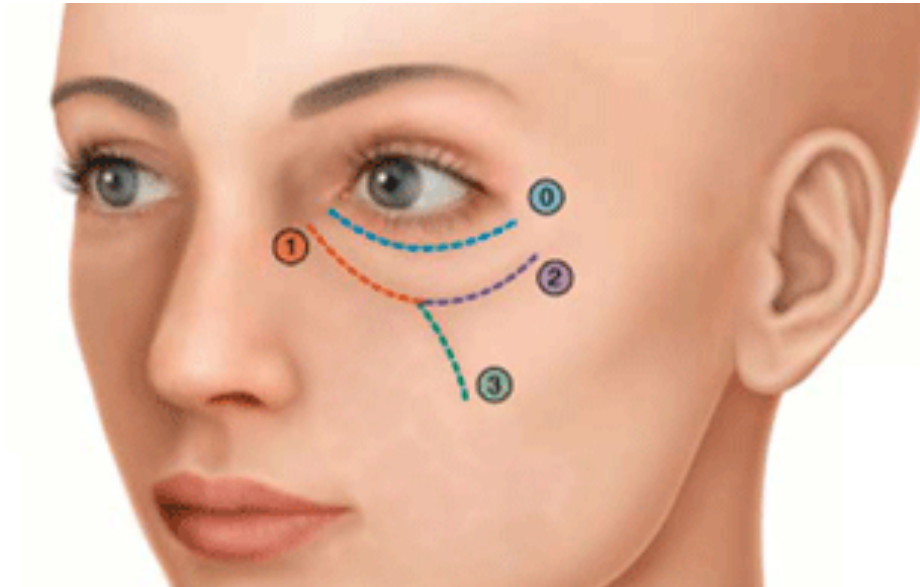
# Vascular Anatomy of the Periorbital Region

- Minefield
- Represents a meeting of the internal and external carotid systems



# Surface Anatomy Terms

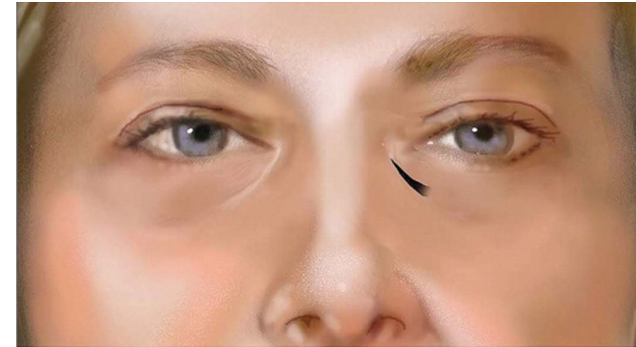
---



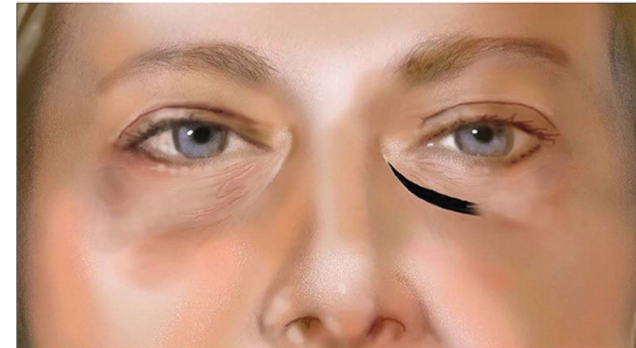
- ① Palpebral line
- ② Tear trough
- ③ Palpebromalar groove
- ④ Mediojugal fold

## Tear Trough Classification

- Class 1 True Tear trough medial Third
- Class 2 Medial depression extending to mid-pupillary line associated with some medial volume depletion
- Class 3 Full depression exposing the orbital rim fully often associated with significant volume loss and malar prominence



Class I



Class II



Class III

## Contraindications to Treatment

Key to a satisfactory result is correct patient selection

Unrealistic expectations

Infection at injection site

Patients who have had surgery or really need surgery

Poor skin, severe elastosis, poor snap reflex

Patients with significant early morning swelling or severe malar bags

Be careful with patients with very thin or transparent skin



# Injection Tips

Use

- Use low viscosity HA to correct tear trough

Inject

- Inject at the supra-periosteal at the level of the orbital rim

Don't inject  
behind

- Don't inject behind the orbital septum

Be

- Be mindful of the arteries locally

Consider

- Consider using a cannula

Distribute

- Evenly distribute product

Avoid

- Avoid overcorrection-may need 2-3 sessions

# Injection Tips Continued

---

## Don't forget

- Don't forget to think about midface. This can support the lower lid-cheek junction and reduce scleral show. Also injection over lateral zygoma can lift the lateral canthus

## Consider

- Consider treating the lateral canthal region. This again can improve canthal tilt. Supra periosteal bolus ( 0.05-0.1 ml )

## Avoid

- Avoid using more that a total of more than 0.5mls each eye per session

# Further Tips

---

When injecting medial Tear trough. The muscle, orbicularis oculi is very adherent to the bone. So at best your product will be deposited intramuscularly

With age the muscle fibres tend to separate allowing product to seep between them resulting in superficial migration

Complications.  
Immediate

Pain

Redness

Swelling

Bruising

Asymmetry

## Complications. Delayed

Infection

Tyndall. Superficial placement of filler

Post inflammatory pigmentation

Hemosiderin staining

Swelling/Puffiness. Overcorrection, nature of the product, patients with a history of swelling or malar festoons. Can fluctuate

Lumps and bumps. May be treated with massage, incision or Hyalase

Blindness

# Concluding Tear Trough Correction

Periorbital rejuvenation using temporary dermal filler can create outstanding clinical results

However this area can be challenging and is not forgiving

It is estimated that about  $\frac{1}{4}$  of all tear trough injections results in a complication

Always remember to think beyond the tear trough. Consider correcting volume loss in the medial and lateral cheek as well

## And Finally

- I cant make you an expert in the space of an hour. This comes with time, experience, making errors and learning from those errors.
- Experts make things look simple and that's generally because they can do the ordinary stuff extraordinarily well

## Gartner Hype Cycle

