

Vascular Complications of Soft Tissue Fillers

Alan Matarasso MD¹, Sammy Sinno MD², Karol Gutowski MD³

1-Manhattan Eye, Ear, Throat Hospital Department of Plastic Surgery

2-New York University Medical Center Department of Plastic Surgery

3- University of Illinois Chicago, Division of Plastic Surgery

Disclosure

There are no relevant conflicts of interest to disclose.

Vascular Complications of Soft Tissue Fillers *(Not Fat)*

Overview

- I. Filler categories and characteristics
- II. Vascular complications
 - Skin
 - Stroke
 - Eye
- III. Nasal Fillers – Injection Rhinoplasty
- IV. Strategies for avoiding complications
- V. Crash kit

Matarasso, A., Nikfarjam, J., Abramowitz, L. "How We Incorporate Minimally Invasive Procedures into An Aesthetic Surgery Practice". Minimally Invasive Plastic Surgery for the Aging Face (Edited by D. Mumford and Kenneth Rothaus). Clin Plast Surg 43 (3), 605-610.

ASPS Statistics

COSMETIC MINIMALLY-INVASIVE PROCEDURES	2014	2013	2000	% CHANGE 2014 vs. 2013	% CHANGE 2014 vs. 2000
Botulinum Toxin Type A (Botox, Dysport)***	6,673,608	6,321,160	786,911	6%	748%
Cellulite treatment (Velosmooth, Endermology)	29,243	29,318	23,952	0%	22%
Chemical peel	1,250,059	1,163,333	1,149,457	7%	9%
Intense Pulsed Light (IPL) treatment	621,724	602,659	*	3%	*
Laser hair removal	1,112,046	1,077,158	735,996	3%	51%
Laser skin resurfacing	543,731	511,795	170,951	6%	218%
Ablative	152,478	146,199	*	4%	*
Non-ablative (Fraxel, etc.)	391,253	365,596	*	7%	*
Laser treatment of leg veins	207,790	208,069	245,424	0%	-15%
Microdermabrasion	881,905	970,343	868,315	-9%	2%
Sclerotherapy	323,609	321,477	866,555	1%	-63%
Soft Tissue Fillers	2,301,673	2,242,621	652,885	3%	253%
Calcium hydroxylapatite (Radiesse)	257,953	284,488	*	-9%	*
Collagen	22,049	60,565	587,615	-64%	-96%
Porcine/bovine-based (Evolve, Zyderm, Zyplast)	16,023	14,465	*	11%	*
Human-based (Cosmoderm, Cosmoplast, Cymetra)	6,026	46,100	*	-87%	*

FDA Warning

- Systematic review showing 61 patients with severe complications from soft-tissue fillers
 - Skin necrosis
 - Blindness



FDA Safety Communication

May 2015

- “Unintentional injection can block blood vessels and restrict blood supply to tissues.”
- “Soft tissue fillers should be injected only by health care providers who have appropriate training and experience and who are knowledgeable about the anatomy at and around the injection site.”

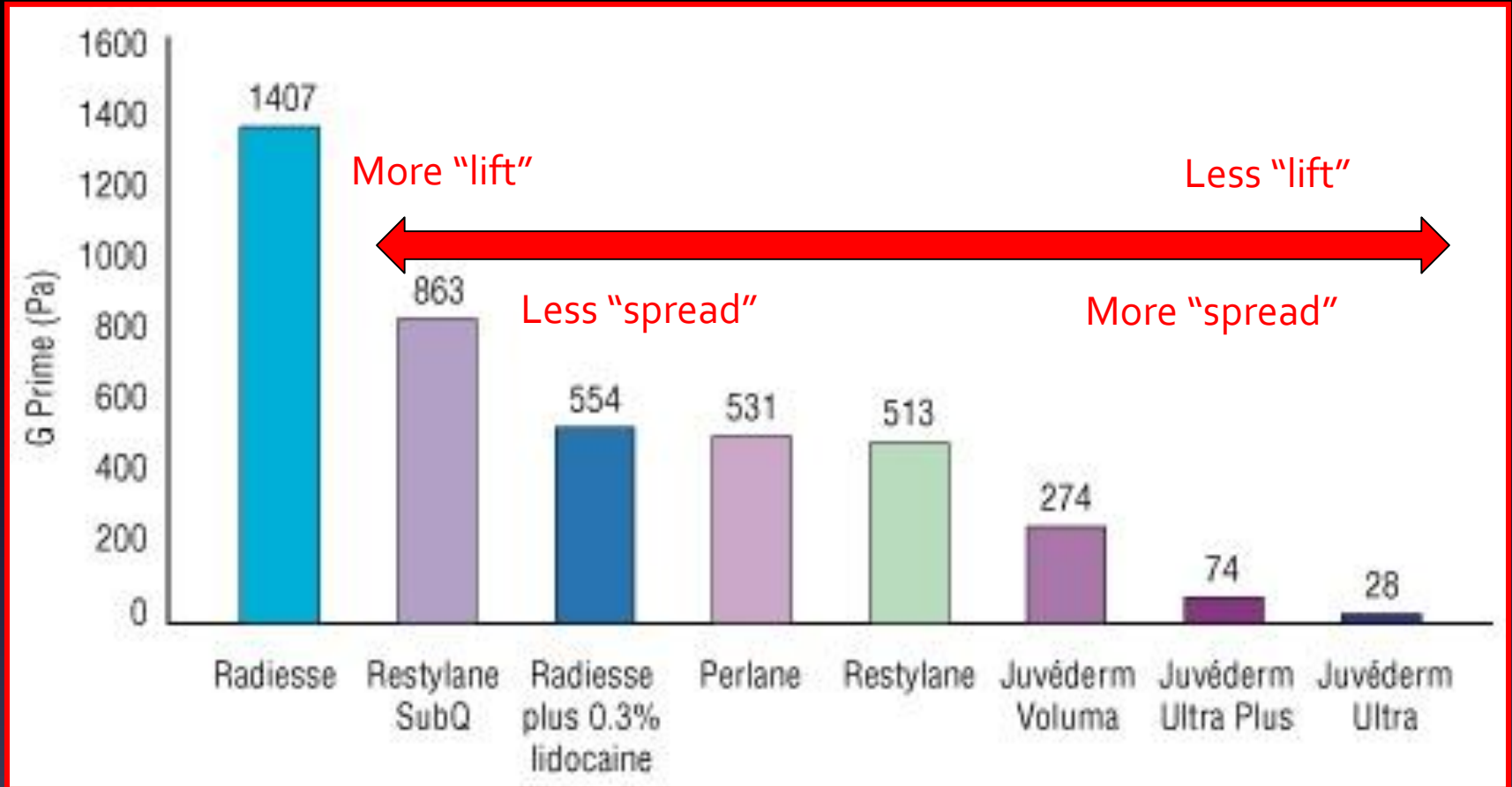
I. FILLER CATEGORIES AND CHARACTERISTICS

Soft Tissue Fillers

Categories

- HA gel (Juvederm-Allergan, Restylane-Galderma, Belotero-Merz)
- PLLA (poly-L-lactic acid) (Sculptra)
- Calcium hydroxylapatite (Radiesse)
- PMMA (Bellafill)

*G Prime



*Mathematical description of products tendency to be deformed elastically. (syrup vs. jello)
May not match clinical results.

Filler Characteristics Are Responsible for Their Clinical Effect (HA Fillers)

- G prime= Measurement of resistance to deformation, contributes to stiffness, hardness, and elasticity of product
 - The greater the G' the deeper the injection should be
- Cross-linking= Stabilizes HA molecules, increases viscosity by transforming liquid HA to gel, and increases resistance to degradation by native hyaluronidase
- Concentration= Increased HA concentration increases longevity and displaces more tissue *must be cross-linked to stabilize HA*

Funt D. Dermal fillers in aesthetics: an overview of adverse events and treatment approaches. Clin Cosmet Investig Dermatol. 2013.

Filler Characteristics Are Responsible for Their Clinical Effect (HA Fillers)

- Small particles= superficial injection
- Large particles= deep injection
- Restylane (Galderma) products are particulate and rely on particle size and G prime for longevity/lift ("G": = 513)
- Juvederm (Allergan) products are a cohesive gel and rely on concentration and cross-linking for longevity/lift ("G": = 274)
- **use different products in different areas

Common Fillers

Brand Name	Manufacturer	Component	Duration of Effect
Restylane Silk Restylane Lyft	Galderma	HA gel	6-9 months 10-18 months
Juvederm Ultra Juvederm Ultra Plus Voluma	Allergan	HA gel	1 year 1 year 1-2 years
Belotero Balance	Merz	HA gel	1 year
Sculptra	Dermik	PLLA	2 years
Radiesse	Merz	Calcium hydroxylapatite	12-15 months
Bellafil	Suneva	PMMA	>2 years

Adverse Events

Early Complications	Late Complications
Injection site reactions	Infection
Infection	Granuloma
Hypersensitivity	Migration
Lumps, asymmetries, contour irregularities	Immune reaction
Skin discoloration (Tyndall)	Scarring
Vascular occlusion	Edema

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II. VASCULAR COMPLICATIONS

Vascular Occlusion

1. Ischemia/skin necrosis
2. Stroke
3. Vision loss/blindness

Etiology of Ischemia/Necrosis

1. Arterial embolization by hyaluronic acid particles,
2. External pressure on the arteries (particularly nasal tip and ala)

Signs and Symptoms of Intraarterial Injection

1. Skin

- PAIN
- Reticulated erythema
- Nausea
- Skin blanching
- Slow, poor capillary refill
- Swelling
- Demarcation

2. Stroke

- “FAST”: facial drooping, arm weakness, speech impediment, time (act fast!)

3. Eye

- Vision loss/blindness

II a) Progression of Skin Changes flow...

Findings	Timing
Blanching	Seconds
Reactive hyperemia or livedo pattern	Minutes up to 10 minutes
Blue-black discoloration	10 minutes to hours
Blister/bullae formation	Hours to days
Skin breakdown, ulceration, slough	Days to weeks

Discoloration

Minutes to
hours



Blister/Bullae Formation

Hours to
days



Skin Breakdown, Ulceration, Slough



Days to weeks

Tissue Necrosis After Intraarterial Injection of Permanent Filler (PMMA)



**weeks later*

Risk Factors For Accidental Intraarterial Injection

- Deep injection near named vessels or tributaries *particularly central facially*
- Rapid/forceful injection/high pressure injection
- Large volume injected into 1 area
- Small sharp needles

III. Nasal Fillers- Injection Rhinoplasty

**Injections in the nose can be used to improve contour*

References

- Schuster B (2015) Injection rhinoplasty with hyaluronic acid and calcium hydroxyapatite: A retrospective survey investigating outcome and complication rates. *Facial Plast Surg* 31:301-307
- Humphrey CD, Arkins JP, Dayan SH (2009) Soft tissue fillers in the nose. *Aesthet Surg J* 29:477-484
- Kurkjian TJ, Ahmad J, Rohrich RJ (2014) Soft-tissue fillers in rhinoplasty. *Plast Reconstr Surg* 133:21e-126e

- Most nasal arteries found in the midline are subcutaneous.
- Filler, for nasal contouring improvement, should be injected deeply to avoid vascular injury leading to compromised perfusion at the dorsum or filler emboli at the nasal tip.
- Tansatit T, Hyoung-Jin, M, Chalermquan R. et al. (2016) "Safe Planes for Injection Rhinoplasty: A Histological Analysis of Midline Longitudinal Sections of the Asian Nose." *Aesth Plast Surg* 40:236-244

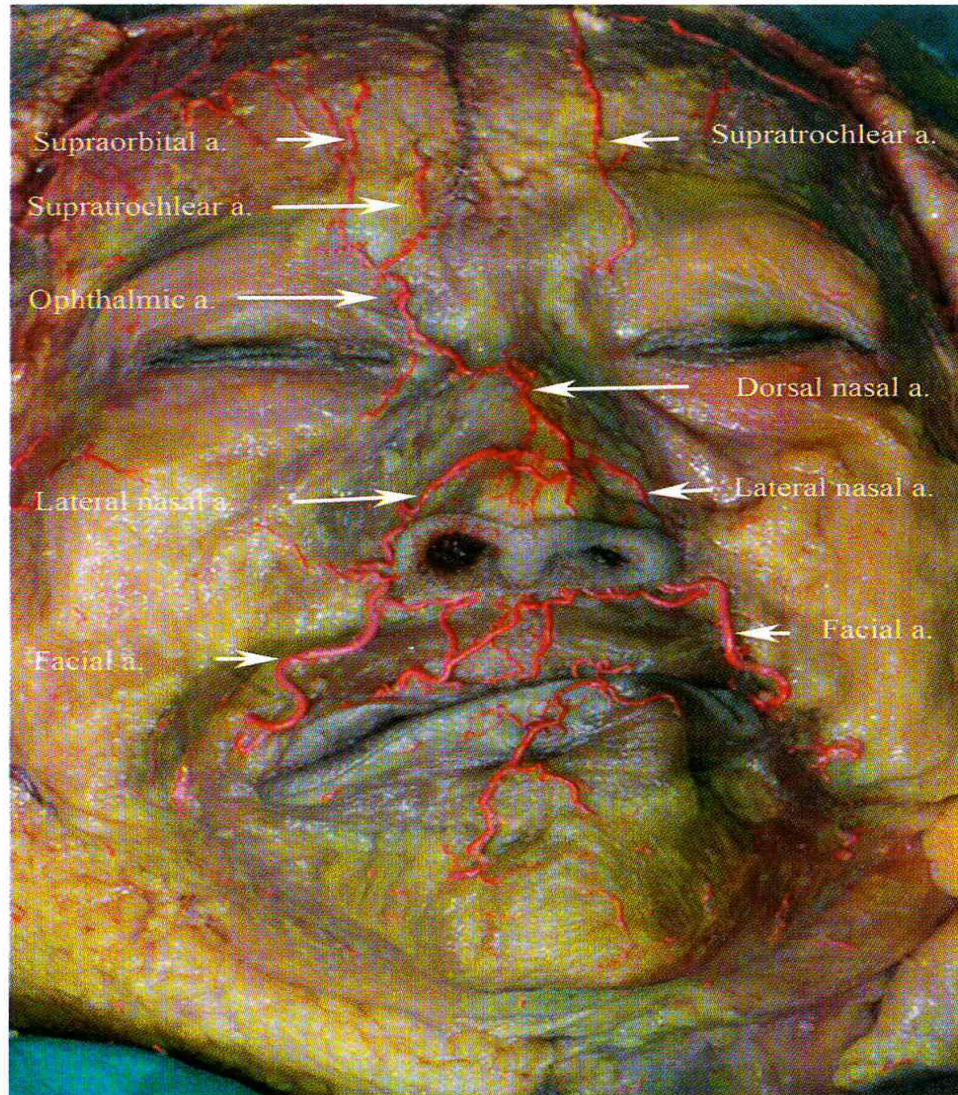


Fig. 8 Midline anastomosis between the lateral nasal arteries and the dorsal nasal artery. The dorsal nasal, supraorbital and supratrochlear arteries branch from the ophthalmic artery after the artery emerges from the right orbital septum

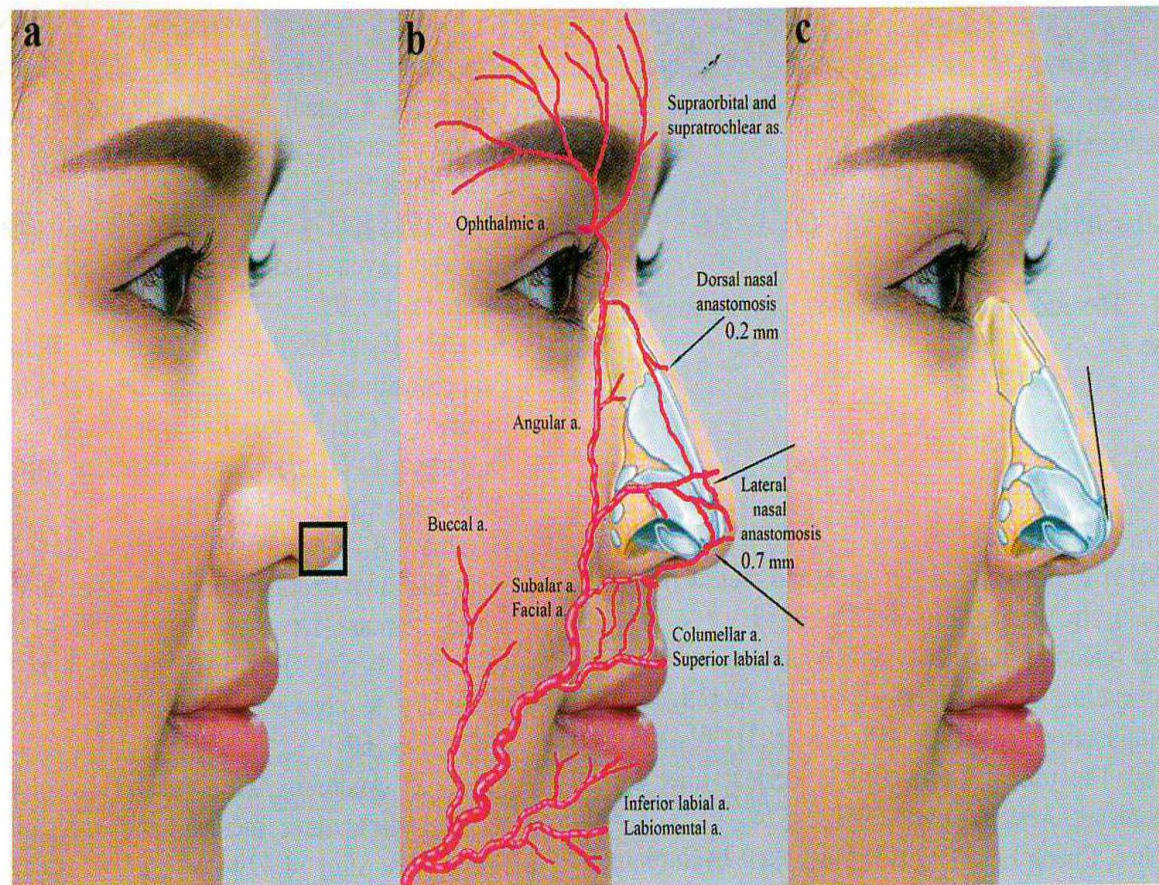


Fig. 9 Summary of the danger areas during nasal injections. **a** The infratip (*square*) is highly vascular as it contains cavernous tissue that continues from the nasal submucosa containing an arteriovenous shunt. **b** Three vascular danger points where filler can escape into the arterial lumen; the rhinion where the dorsal nasal anastomosis is occasionally found, the supratip where significant lateral nasal

anastomoses form, and the infratip in which the columellar artery enters from below and cavernous tissue infiltrates. The supratip (*middle arrow*) poses the highest risk. **c** Recommendation of needle trajectory for tip refinement. Even though an artery is injured by the needle, symptomatic emboli could be avoided by retrograde injection of a small droplet at the time of withdrawal

Nasal Filler Examples - Pre injection

D.G. 26 y/o

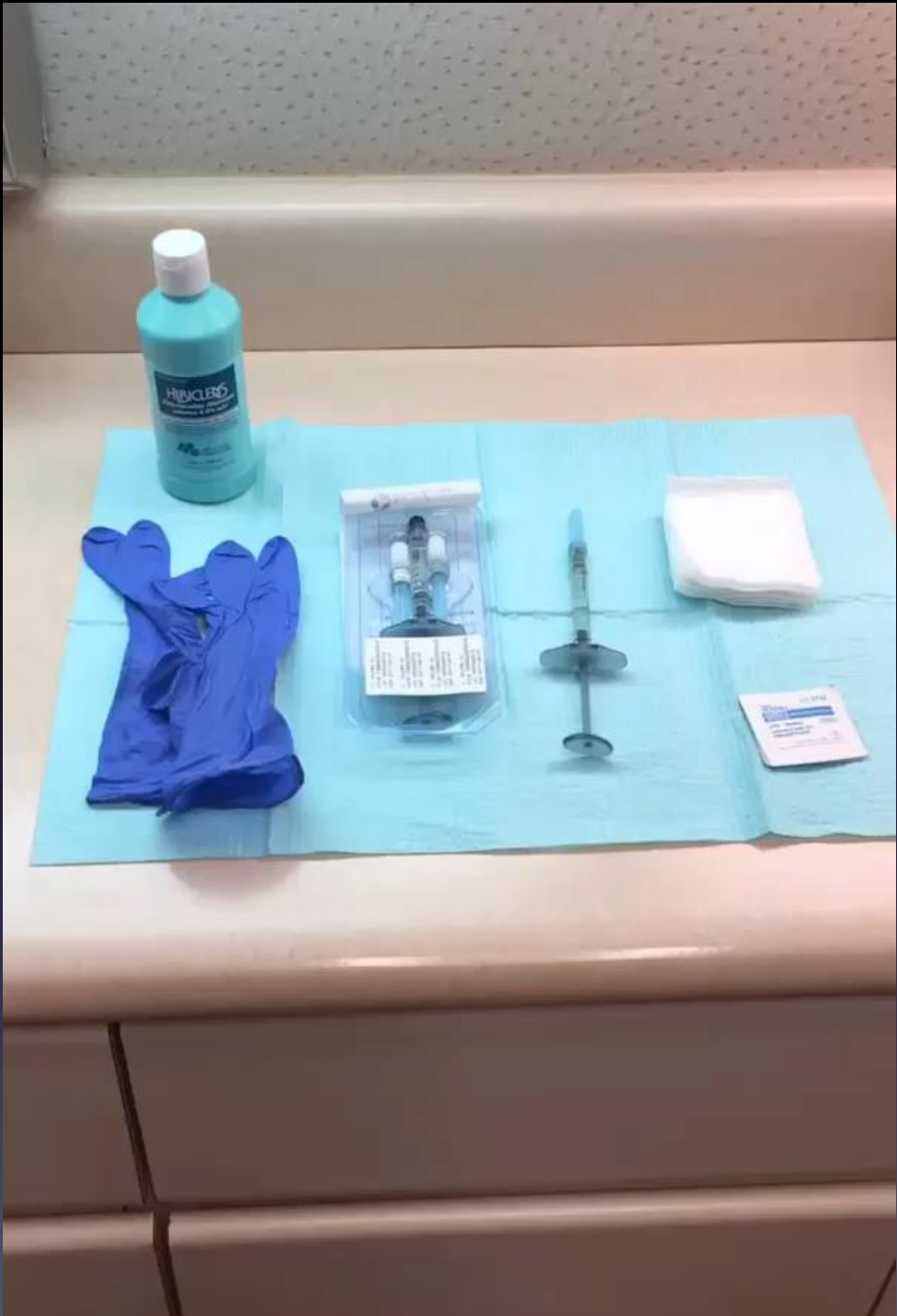


Nasal Filler Examples - Post injection

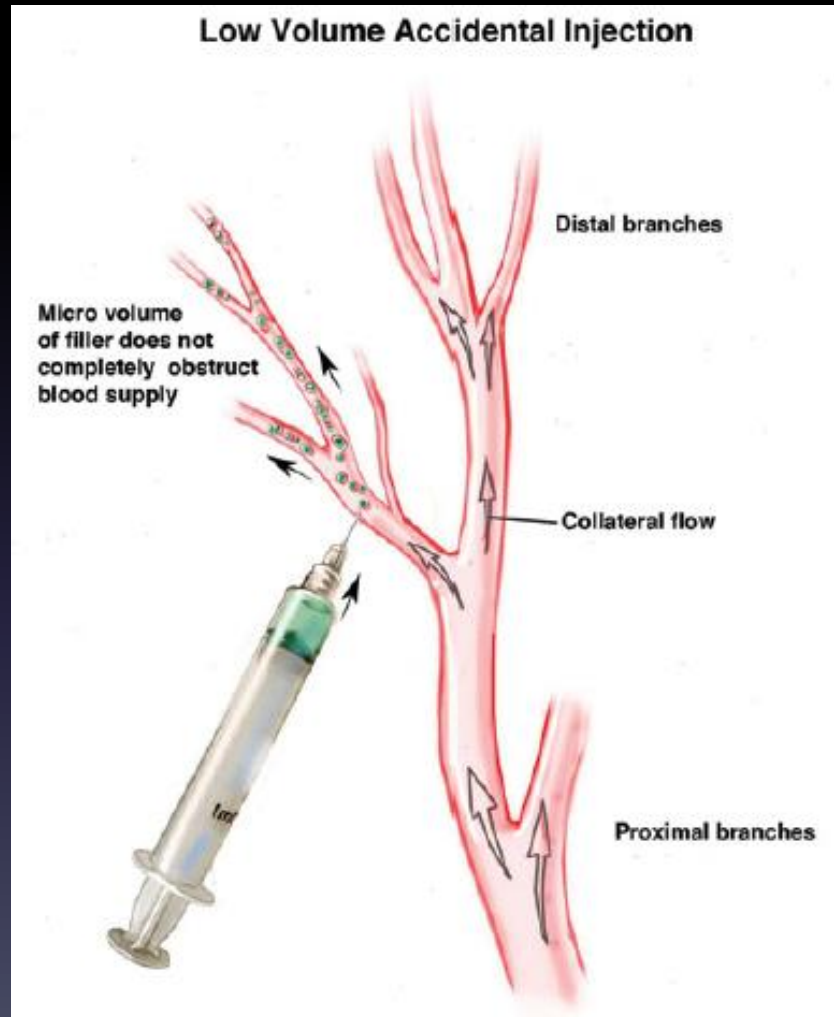
D.G. 26 y/o



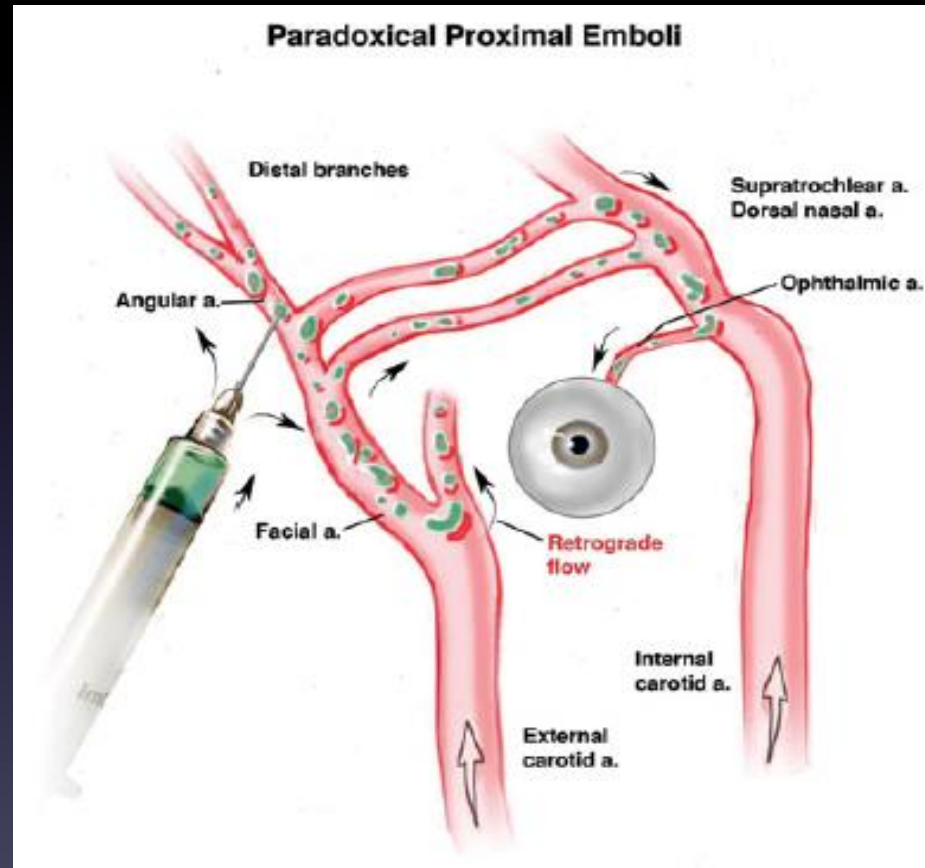
IV. STRATEGIES FOR AVOIDING COMPLICATIONS



IIc) Even Low Volume Accidental Injection Can Lead to Arterial Occlusion if Injected Intraarterially



High Injection Pressure with Large Volume Can Lead to Retrograde Filler Propagation

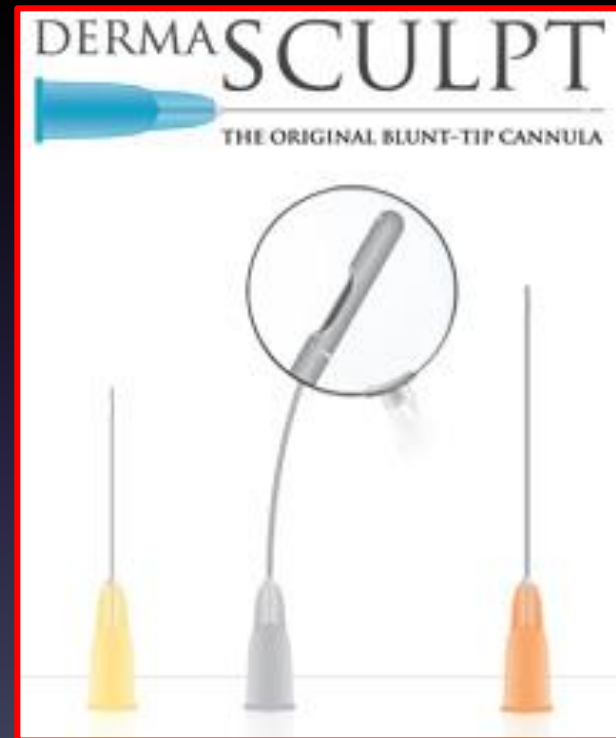


How to Avoid Arterial Injection and Retrograde Filler Propagation

- Epinephrine (AFT vasoconstricts)
- Withdraw before injection (Aspirate)
- Avoid deep injection near named vessels
- Low pressure injection
- Avoiding injecting excess volume in one area
- Slow injection

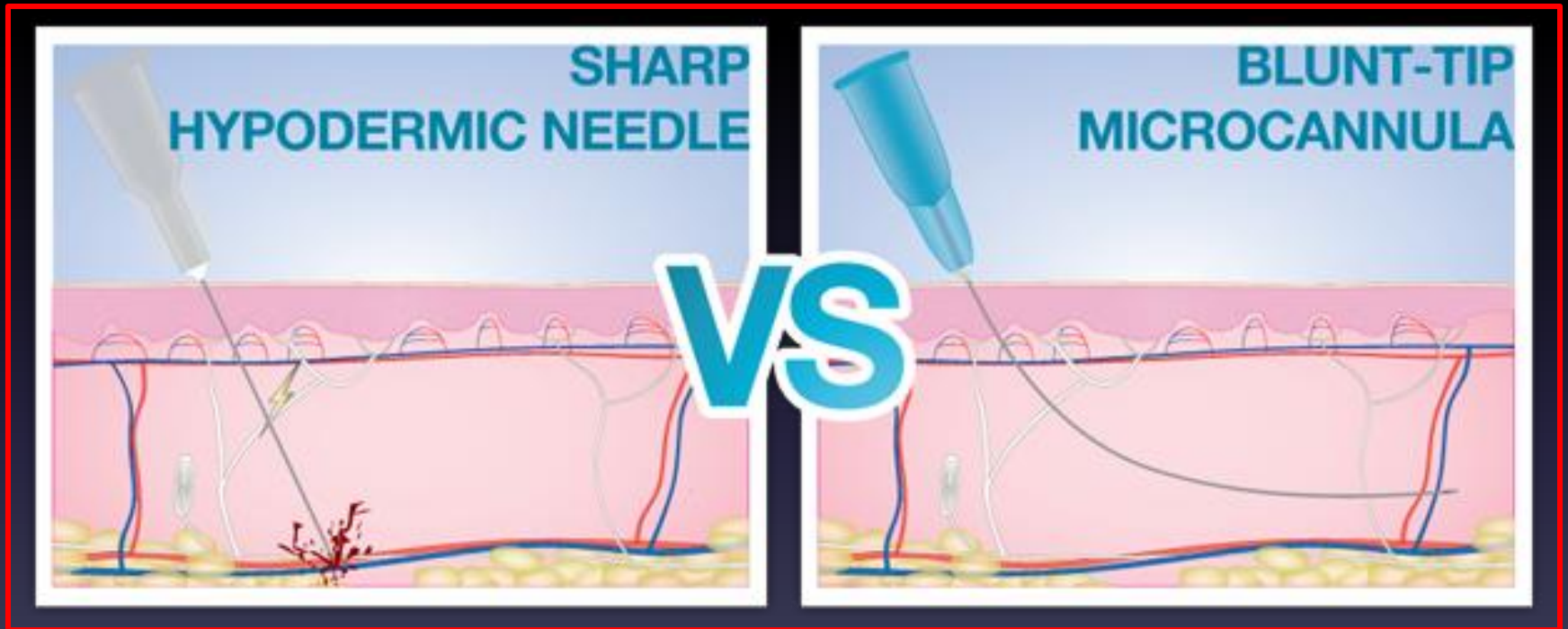
Strategies for Avoiding Complications

- Blunt cannulas
- Small bore
- Microcannula
- Avoiding anatomic danger zones

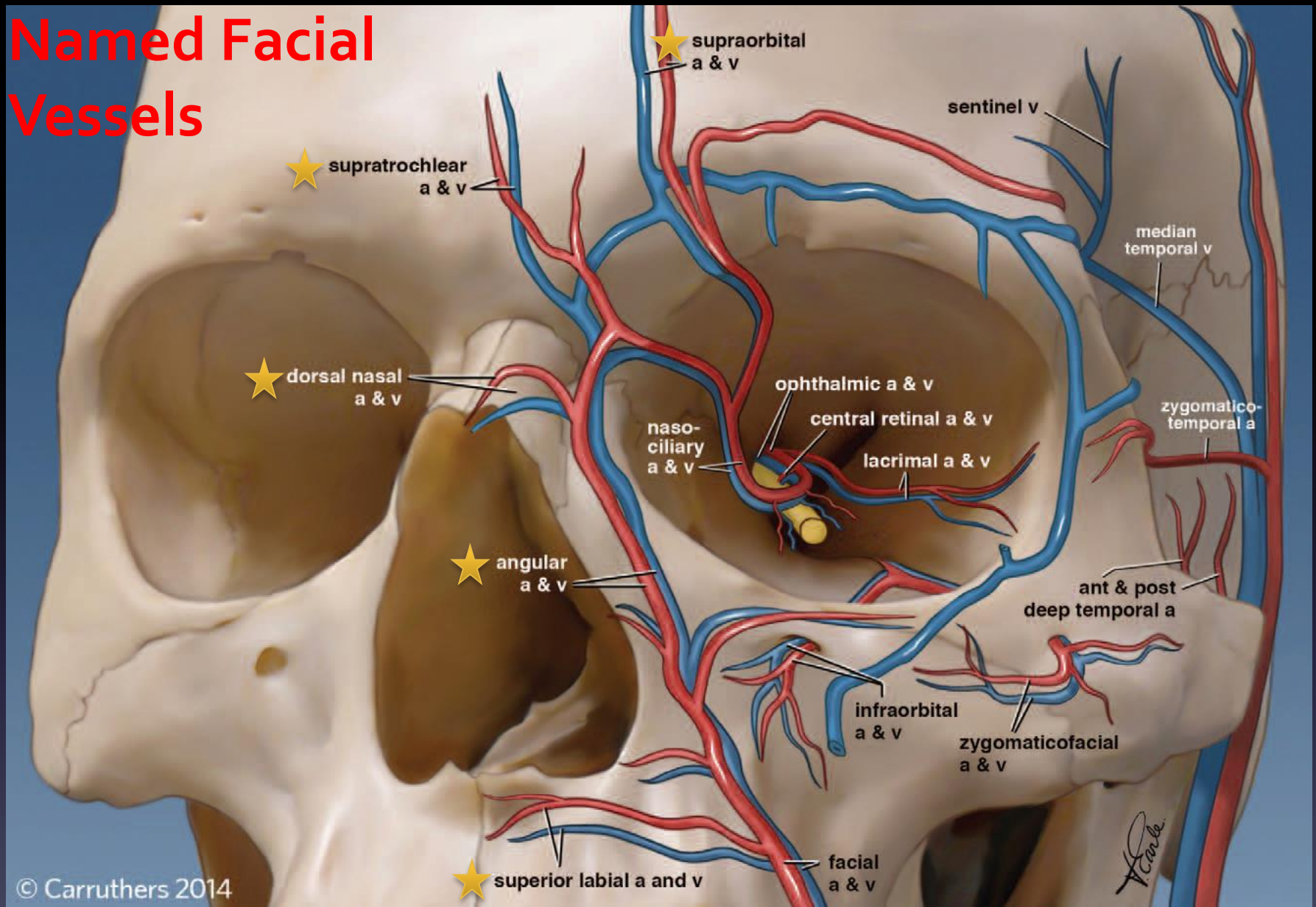


Carruthers JDA, Fagien S, Rohrich RJ, Weinkle S, Carruthers A. Blindness caused by cosmetic filler injection: a review of cause and therapy. PRS. 2015.

Blunt Injection Cannula



Named Facial Vessels



Carruthers JDA, Fagien S, Rohrich RJ, Weinkle S, Carruthers A. Blindness caused by cosmetic filler injection: a review of cause and therapy. PRS. 2015.

III. Locations of Iatrogenic Retinal Artery Occlusion

“Central Facial Injection”

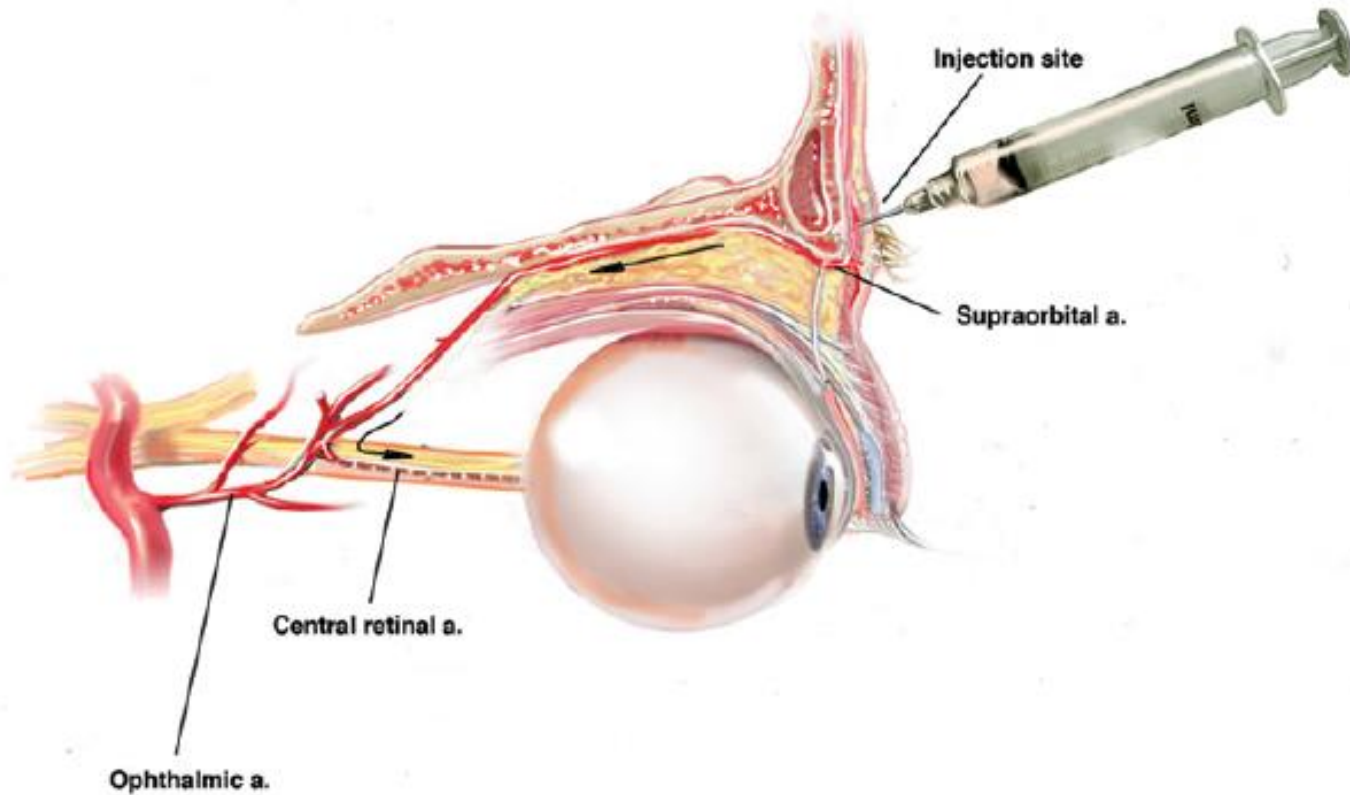
- Glabella (50%)
- Nose (33%) – also nasolabial fold
- Forehead (8%)
- Periorbital (8%)

Strategies for Avoiding Complications

- Inject slowly in small aliquots
- Avoid injection in previously traumatized areas due to change in anatomy
- *Stop injection if complaints of pain/vision loss*

Blindness

Retrograde Flow / Blindness



How to Avoid Blindness

- Cautious injection in peri-orbital area
- Withdraw before injection
- Low pressure injection
- Small aliquots

V. CRASH KIT

Must be readily available, stored
crash kit is an essential component of
any office performing injections

Office Staff Education

- Instruct staff on importance of patient phone calls with possible occlusion
- May present later in the day or the next day

Crash Kit

Ischemia/Necrosis

A) Skin

What to do if patient suddenly develops severe pain with blanching or mottled skin discoloration

Crash Kit (skin)

* The Key is to identify ASAP

- Aspirate area?
- Warm compress
- Nitropaste
- Baby ASA
- Supplemental O₂
- HYALURONIDASE (early <2 days)
 - 400U into subcutaneous area (2cc in a 3cc syringe with [0.2cc plain lidocaine 2%] 27 g-needle) or (150U in 1cc of saline)
 - * non diluted for tissue compromise or for product breakdown, or 50/50 saline
 - * ? Papaverine, tanshinone, topical magnesium sulfate, & infrared radiation

Hylenex

- Recombinant human hyaluronidase injection
- 150U (1cc) if concern for intraarterial injection
- Works only for HA's
 - Juvederm Family
 - Restylane Family
 - Belotero
 - Emervel
 - Teosyal



Managing Vascular Compromise

	<i>Arterial Occlusion</i>	<i>Venous Occlusion</i>
Presentation	Immediate or early, blanching, severe pain	Delayed, dull pain, dark discoloration
Management	Stop injection, attempt aspiration Massage Warm compresses 2% nitroglycerin paste* Injection of hyaluronidase (if caused by HA product) Antibiotic therapy (topical, parenteral, or both) in cases of skin breakdown Conservative debridement Frequent follow-up	Massage Warm compresses 2% nitroglycerin paste* Injection of hyaluronidase (if caused by hyaluronic acid product) Consider hyperbaric oxygen in cases of impending massive skin necrosis Antibiotic therapy (topical, parenteral, or both) in cases of skin breakdown Conservative debridement Frequent follow-up
Prevention	Informed consent Smallest possible needle Smallest possible volume injected Proper plane of injection	Informed consent Smallest possible needle Smallest possible volume injected Proper plane of injection

- Different presentation, same treatment

Pearl

- Blunt, small needle, small volumes, low pressure,
- *Caution at nasal tip/central face*

Crash Kit

Thrombotic/Vision

B) Stroke

- Standard emergency stroke protocol

C) Vision loss/blindness

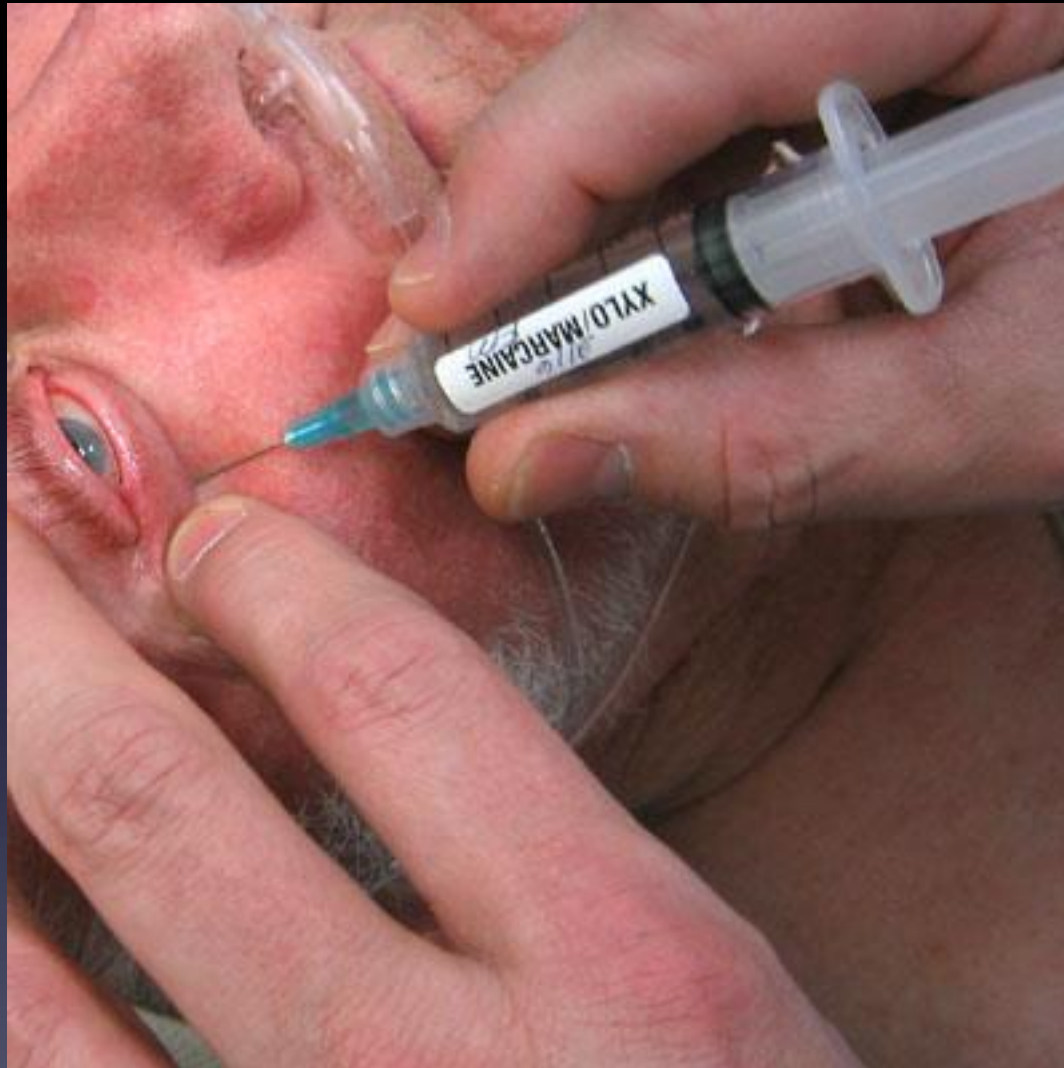
- Urgent ophthalmology consult
- Retrobulbar hyaluronidase injection

Vision Loss/Blindness

Retrobulbar Injection Technique

- Small bleb of local anesthesia injected into lower eyelid over inferotemporal orbit
- Blunt, 25g cannula advanced in inferotemporal quadrant of orbit for 1 inch (will be inferior and lateral to optic nerve)
- 2-4cc hyaluronidase injected

Retrobulbar Injection Technique



Summary

- Awareness that **vascular complications** are a **real event** with soft tissue fillers
- Practice strategies to avoid these complications
- **Post a protocol** in office and **have a filler crash kit available**

Thank You

Alan Matarasso MD¹, Sammy Sinno MD², Karol Gutowski MD³

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THE MEETING