COMPLICATIONS AND THEIR MANAGEMENT IN AESTHETIC DERMATOLOGY

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European Dermatology Forum
EURODERM excellence

21st Edition of Euroderm Excellence Training Program

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Budapest, Hungary

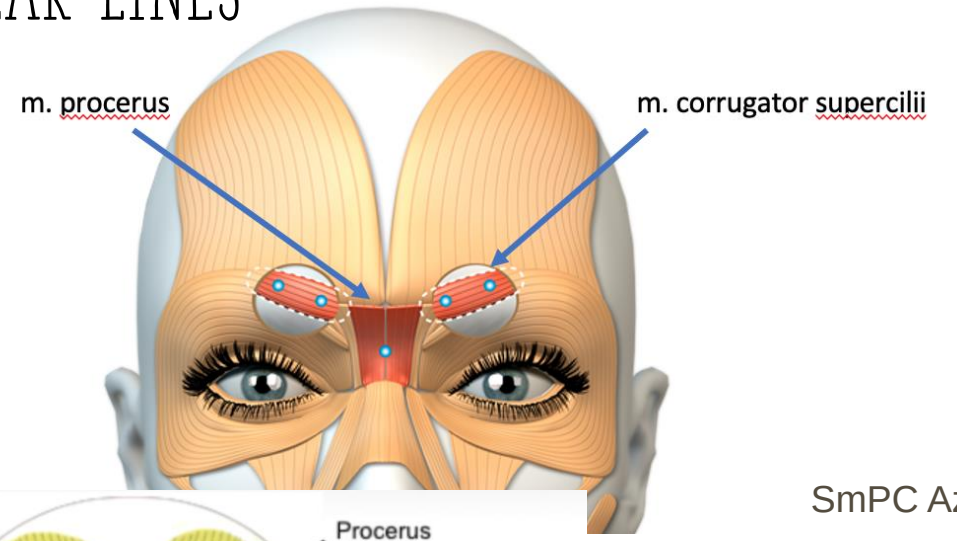
Excellence in dermatological diagnostics, differential diagnostics and therapy

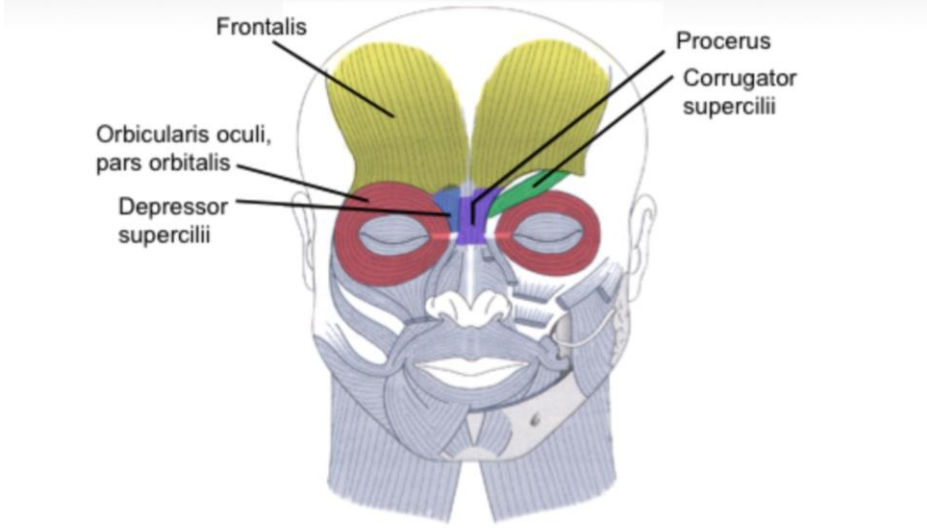
MINIMAL INVASIVE AESTHETIC PROCEDURES

- Safety first! Be aware of possible adverse events, do everything to avoid them!
  - botulinum toxin treatment: storage, dilution, dosage, placement
  - precise planning, precise injections
- Reveal patients' expectations, treatment options, achievable aesthetic outcome
- Photo, short video
- Informed consent form with every possible side effects or adverse reactions
- Follow up visit if necessary, in case of any complaint, personal check up

BOTULINUM TOXIN TREATMENT OF GLABELLAR LINES

- target muscles:
  - procerus muscle
  - corrugator supercilii muscle
  - orbicularis oculi muscle
  - depressor supercilii muscle



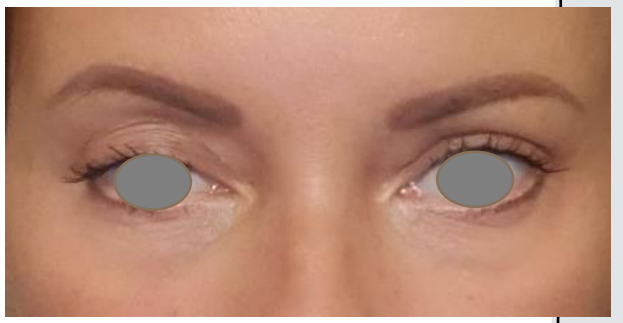


Sommer B, Sattler G, eds. *Botulinum Toxin in Aesthetic Medicine*. Hoboken, NJ: Wiley Blackwell; 2002.

SmPC Azzalure/Dysport®

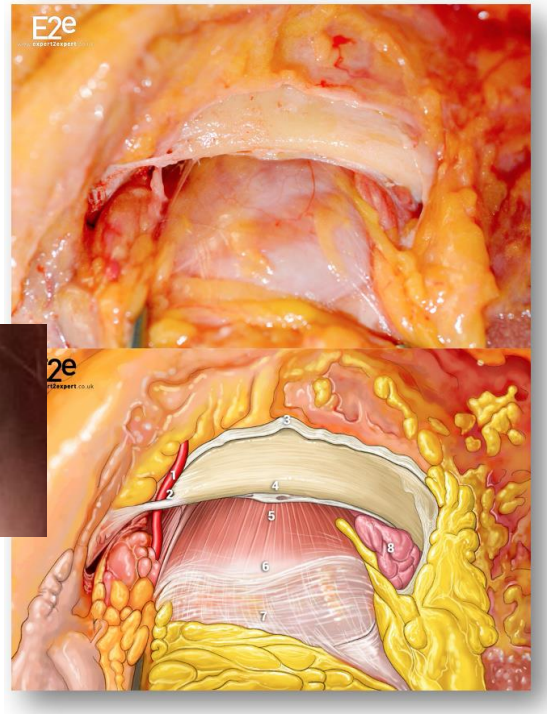
- ABO: 3-7 x 5-15 DU, 30-80 DU
- ONA: 3-7 x 2-4 BU, 8-40 BU

BOTULINUM TOXIN TREATMENT OF GLABELLAR LINES: TOXIN SIDE EFFECTS TO AVOID



- descent of the medial part of the eyebrow (pseudo-mephisto sign)
  - toxin effect on the lower fibers of frontal muscle (injection too superficial or above the corrugator)

- blepharoptosis (ptosis of the upper eyelid)
  - toxin effect on levator palpebrae muscle (injection too close to the orbital rim or deep to the bone, under the muscle)
  - anatomical reasons
  - overdilution, too much volume, overdose
  - previously existing weakness of levator palpebrae muscle
  - resolves spontaneously in 1-6 weeks
  - IOPIDINE (apraclonidin) ocular drops, open eye technique

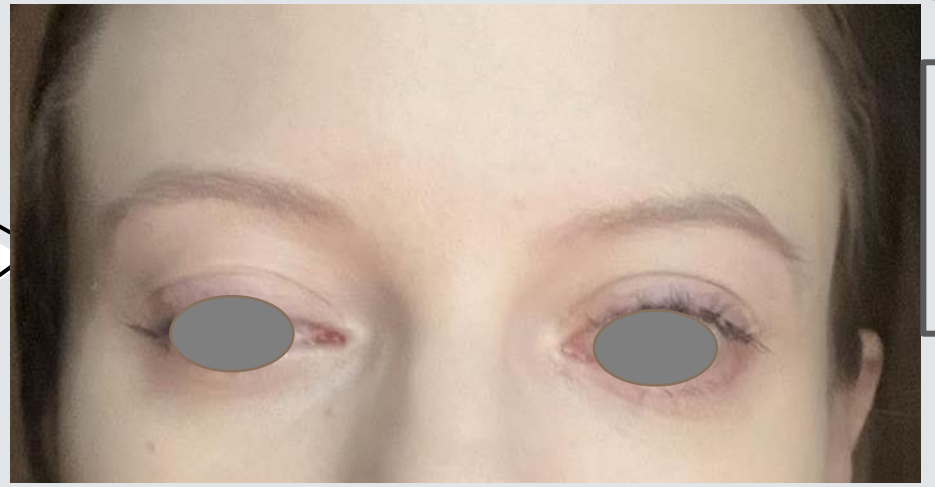


- PREVENTION:
  - avoiding overdosage, overdilution, precise injection points,
  - avoid massage for 1 week after injection
  - 3-point injection (Cotofana 2021)

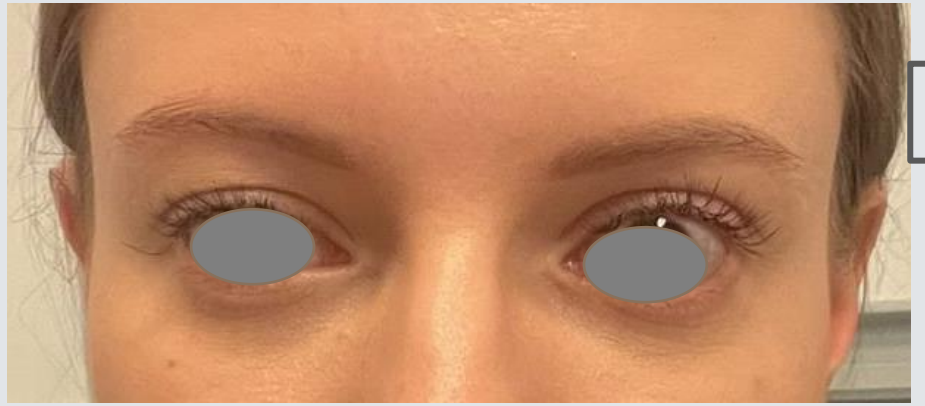
Tremaine A. M. Clin Cosmet Investig Dermatol. 2010; 3: 15–23.
Redaelli A. J Cosmet Laser Ther. 2003 Dec;5(3-4):220-2.
King M. J Clin Aesthet Dermatol. 2016 Dec;9(12):E1-E4.

EYELID PTOSIS AFTER BOTULINUM TOXIN TREATMENT OF THE GLABELLA

one week after botulinum toxin treatment , apraclonidine eyedrop started, temporary improvement

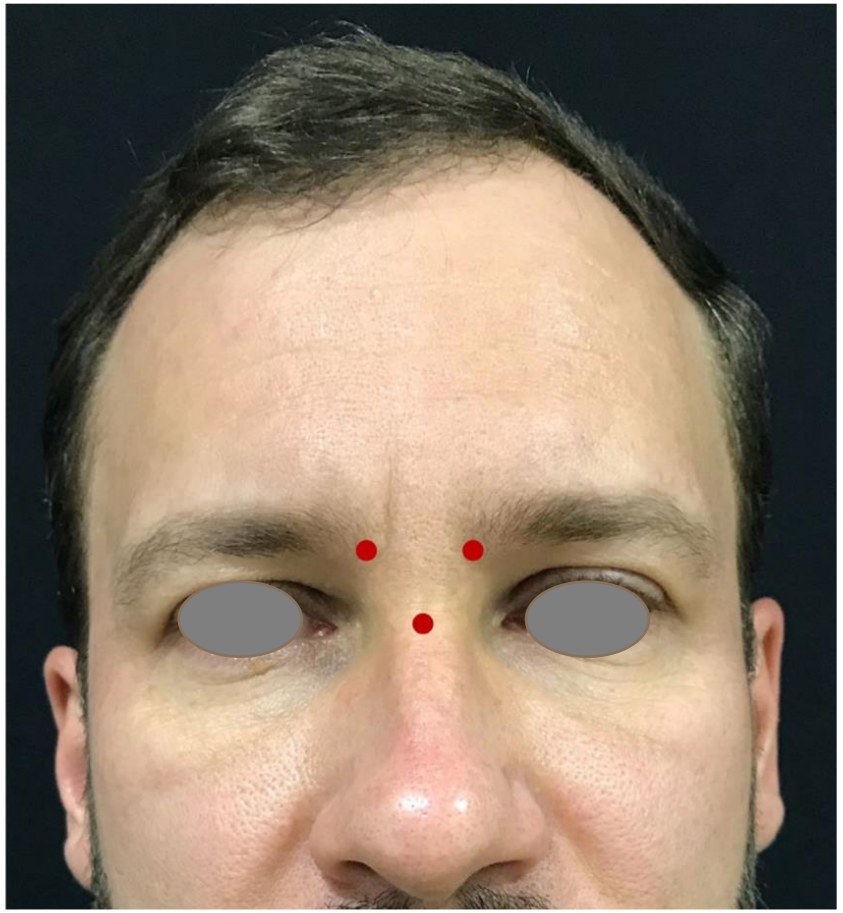


ten days after the botulinum toxin treatment a respiratory illness started, ptosis increased.



after using open eye technique

BOTULINUM TOXIN TREATMENT OF GLABELLAR LINES: MINIMALIZATION OF THE RISK OF TOXIN SIDE EFFECTS



3-POINT TECHNIQUE

S. Cotofana et al, J Cosmet Dermatol, 2021

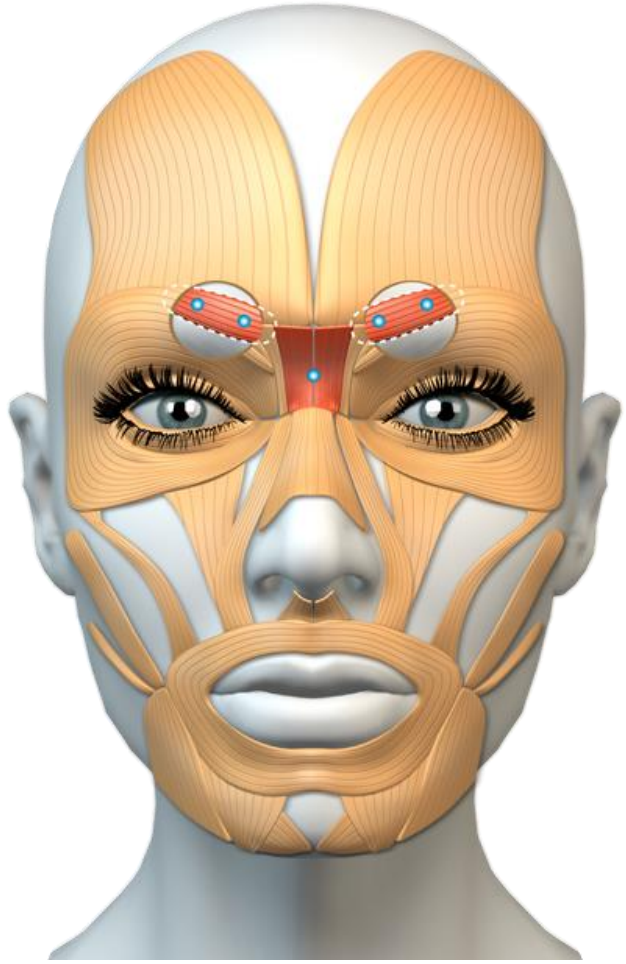
BOTULINUM TOXIN TREATMENT OF GLABELLAR LINES: TOXIN SIDE EFFECTS TO AVOID

- periorbital oedema
  - lymphatic stasis due to the relaxation of orbicularis oculi muscle

PREVENTION:

lower doses

- grotesk elevation of eyebrows ("Mephisto sign"), can be corrected



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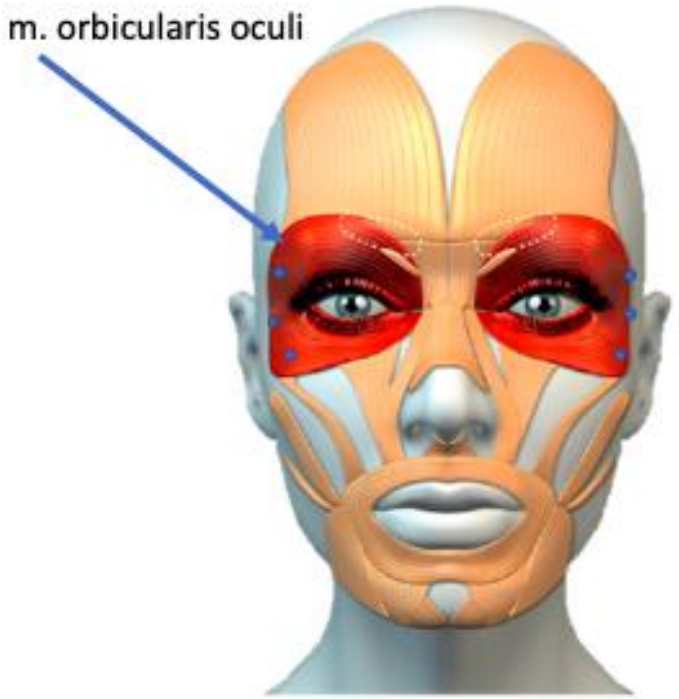
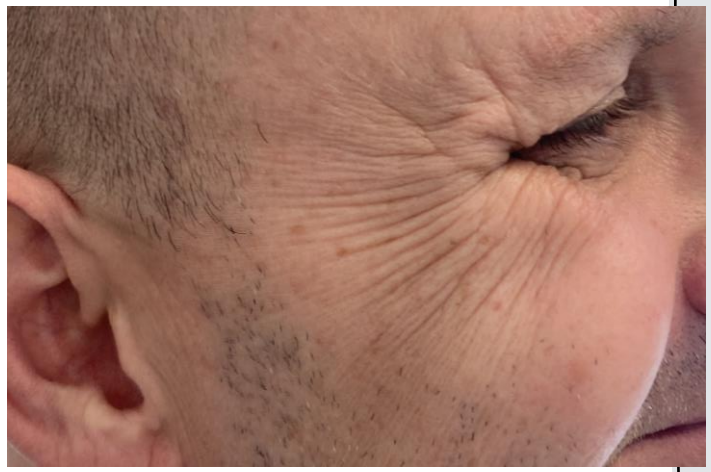
Redaelli A. J Cosmet Laser Ther. 2003 Dec;5(3-4):220-2.
King M. J Clin Aesthet Dermatol. 2016 Dec;9(12):E1-E4.

BOTULINUM TOXIN TREATMENT OF CROW'S FEET



- target muscle: orbicularis oculi muscle
- superficial injections
- eyebrow elevation is possible

- ABO: 2-3x5-15 DU/side
- ONA: 1-5x1-4 BU/side

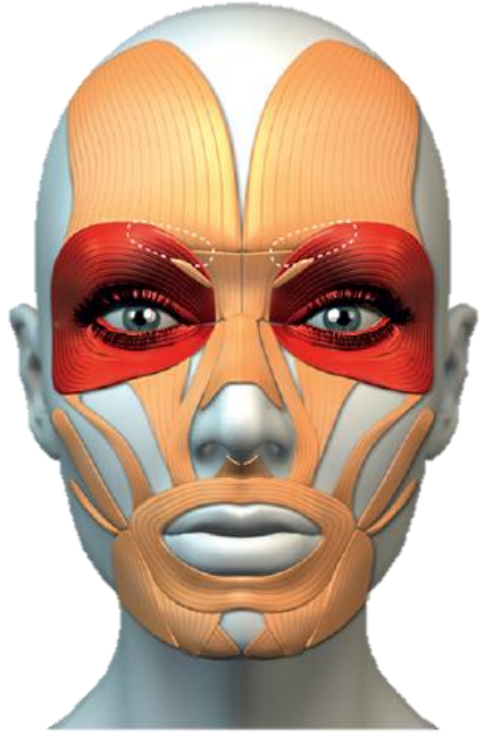


SmPC Dysport, 2020.11.20.

Sundaram et al,
GLOBAL AESTHETICS CONSENSUS GROUP
Plast Reconstr Surg, 2016

BOTULINUM TOXIN TREATMENT OF CROW'S FEET: TOXIN SIDE EFFECTS TO AVOID

- altered smiling, asymmetric smile
  - cause: the lowest injection reaches the zygomatic minor and major muscles
  - prevention: superficial injection, not too low position, smaller dose to the lowest point
- periorbital oedema
  - prevention: avoid large doses
- avoid massage for one week!

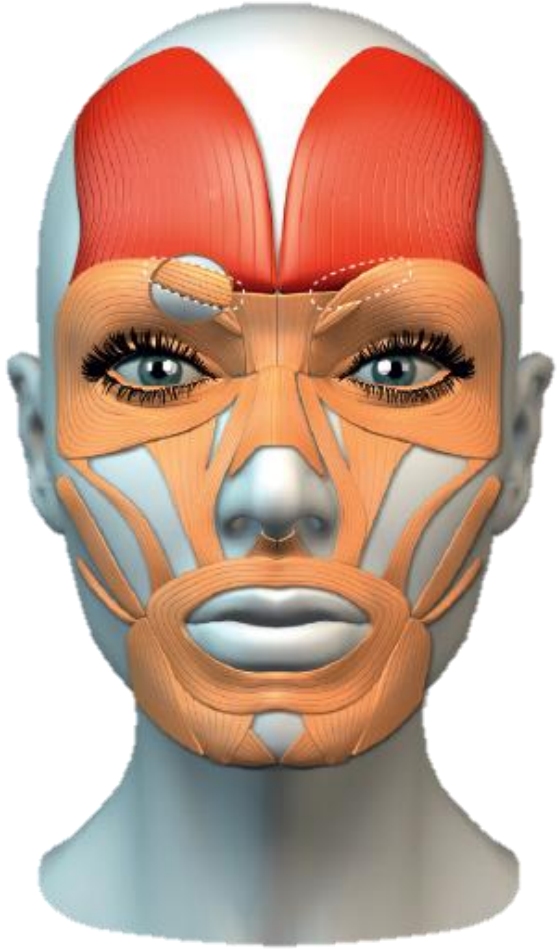


Kim B.W. et al. Adverse events associated with botulinum toxin injection: a multidepartment, retrospective study of 5310 treatments administered to 1819 patients. J Dermatolog Treat. 2014 Aug; 25(4):331-6
Klein A.W. Complications with the use of botulinum toxin. Dermatol Clin 2004; 22:197–205.
Chang Y.S. Medicine (Baltimore). Nonallergic Eyelid Edema After Botulinum Toxin Type A Injection. Case Report and Review of Literature. Medicine 2015 Sep; 94(38): e1610.

BOTULINUM TOXIN TREATMENT OF THE FOREHEAD

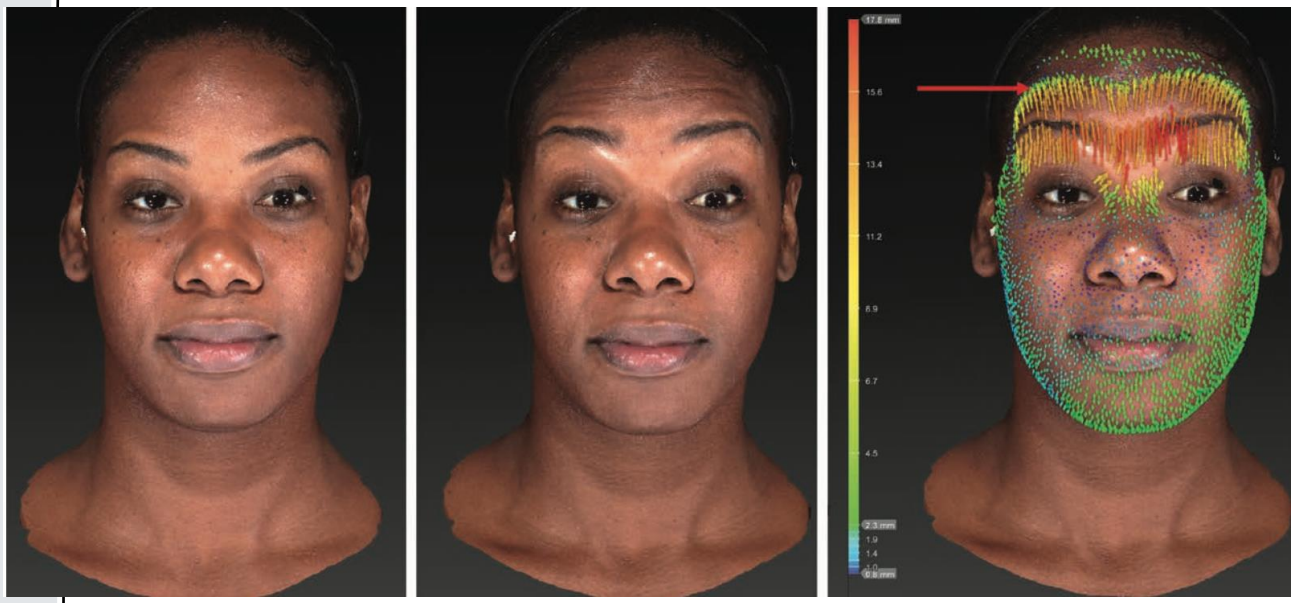
target muscle: frontal muscle

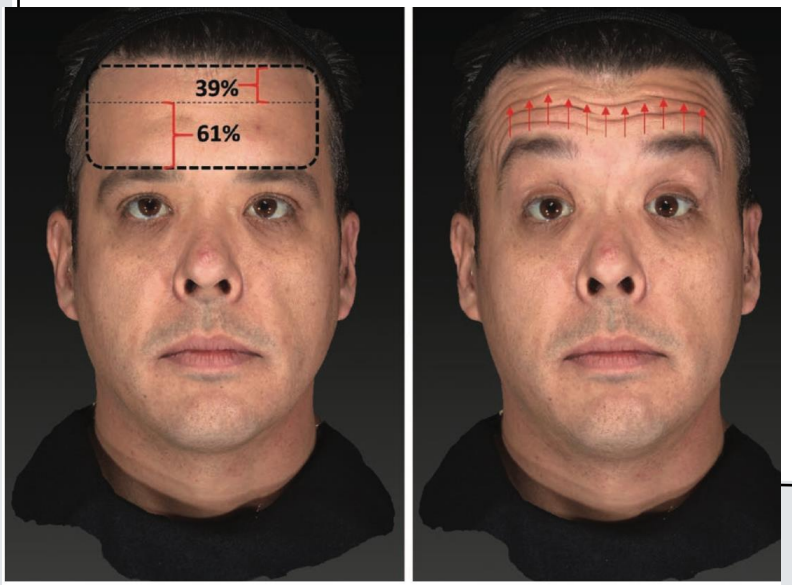
- Be aware of the interaction with procerus muscle, corrugators, orbicularis oculi muscle
- eyebrow position/shape is very important, there is no other muscle which elevate the eyebrows



Sundaram et al,
GLOBAL AESTHETICS CONSENSUS GROUP
Plast Reconstr Surg, 2016

MOVEMENT OF THE FOREHEAD DURING MAXIMAL EYEBROW ELEVATION





- **Bimodal movement of the forehead**
- **szemöldök emelkedése, a hajvonal lefelé mozdulása**

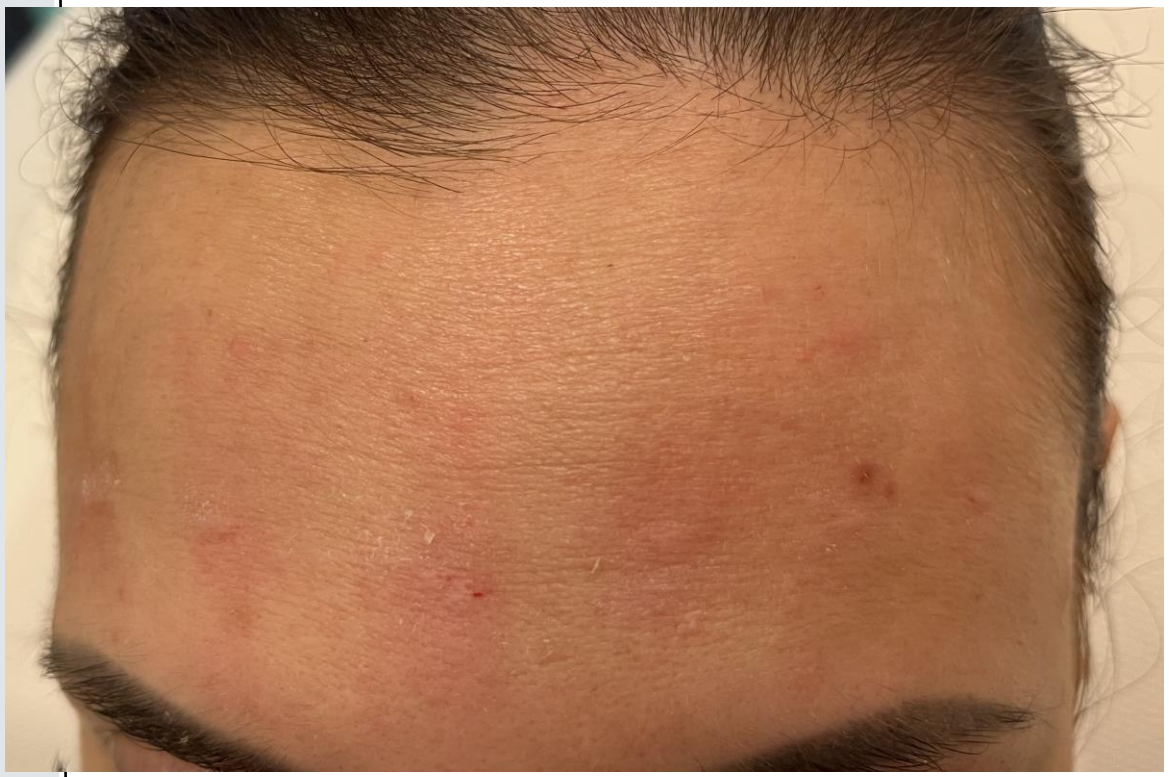
nem mozgó horizontális vonal, ahol a két mozgás találkozik: line of convergence (C-line), szemöldök felett 3-4 cm-rel

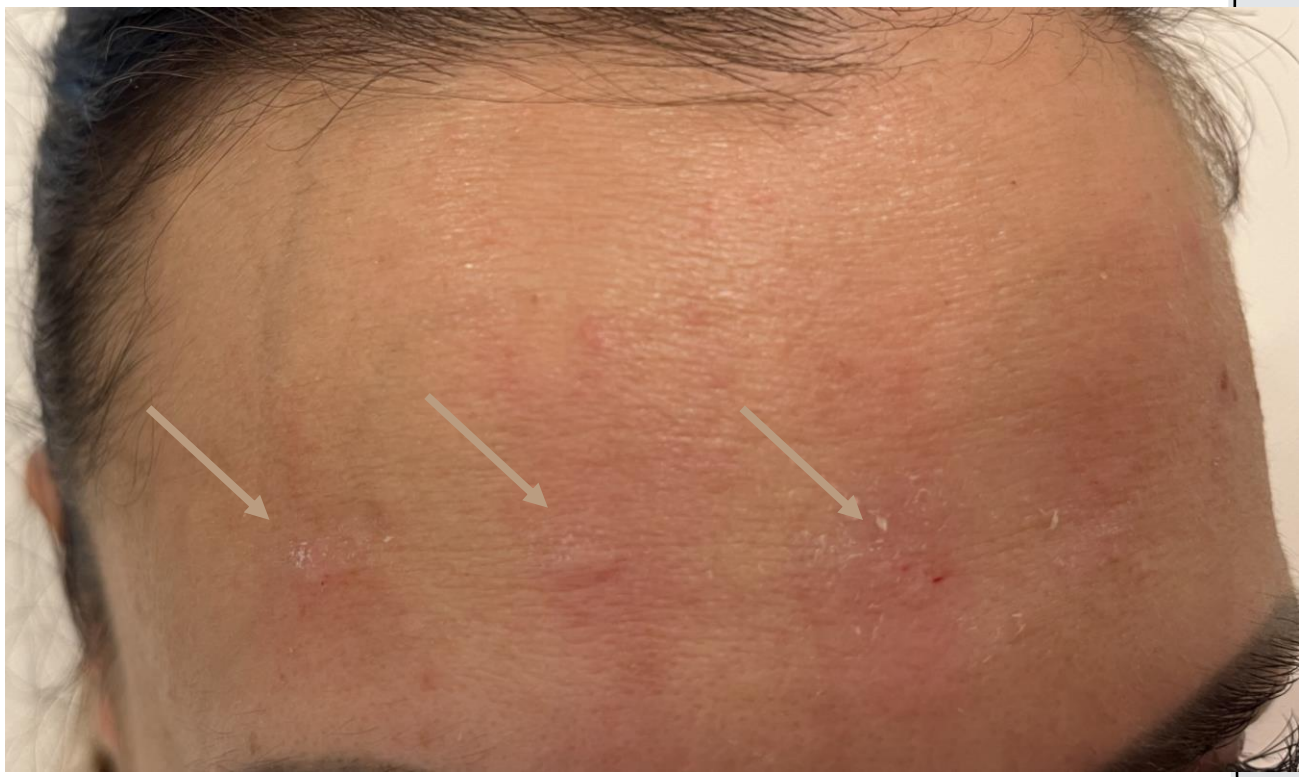
átlagosan a második horizontális ránc vonalában mindkét nemnél , a szemöldök felett 61± 10 %-nál a homlok teljes magasságából

toxin adása a C-vonal felett csökkenti a szemöldök leereszkedésének veszélyét

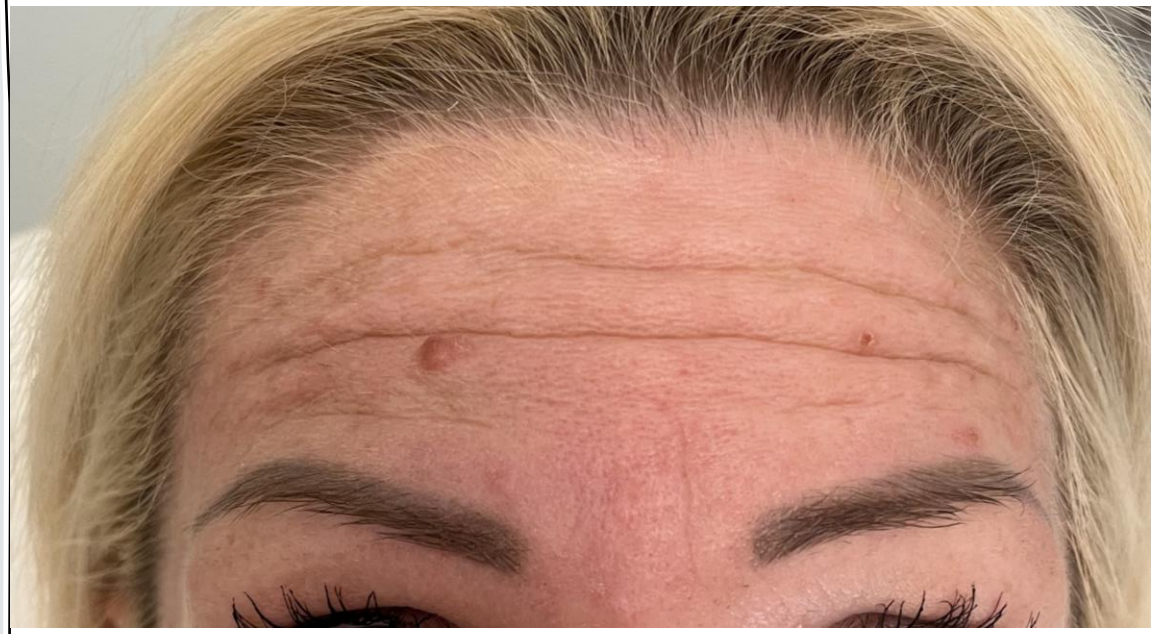
S. Cotofana et al, 2020, **www.PRSJournal.com**
American Society of Plastic Surgeons

INTRADERMAL INJECTIONS IN THE LOWER THIRD OF FOREHEAD
5X1 U ABOBOTULINUM TOXIN

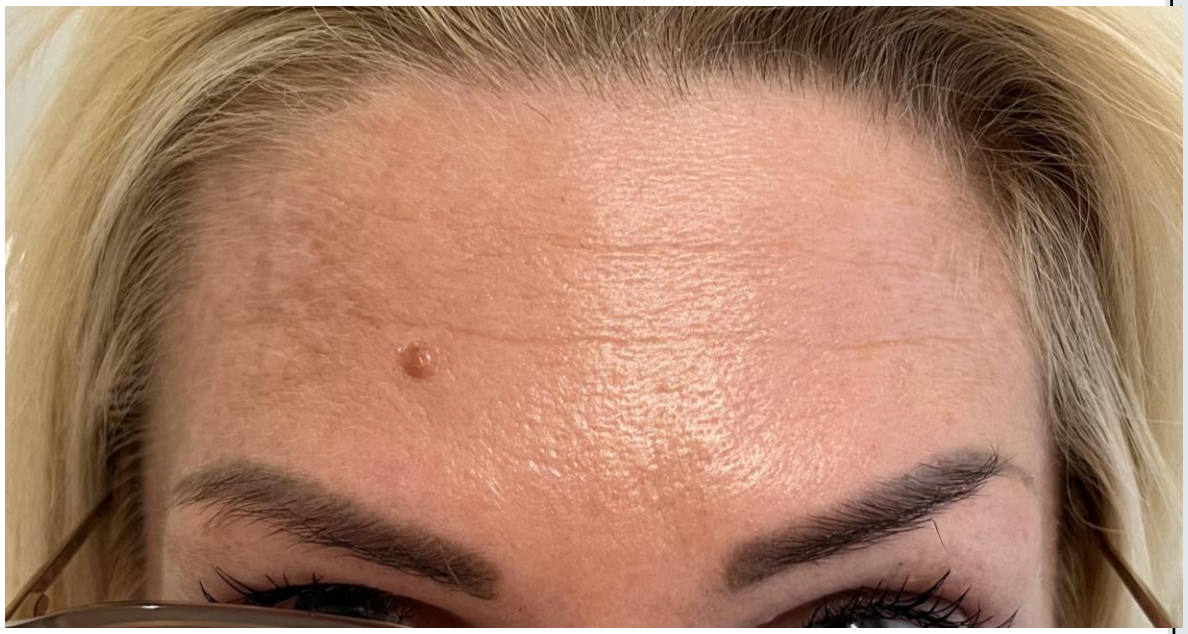




BOTULINUM TOXIN TREATMENT OF THE FOREHEAD (ABO-BONT-A)



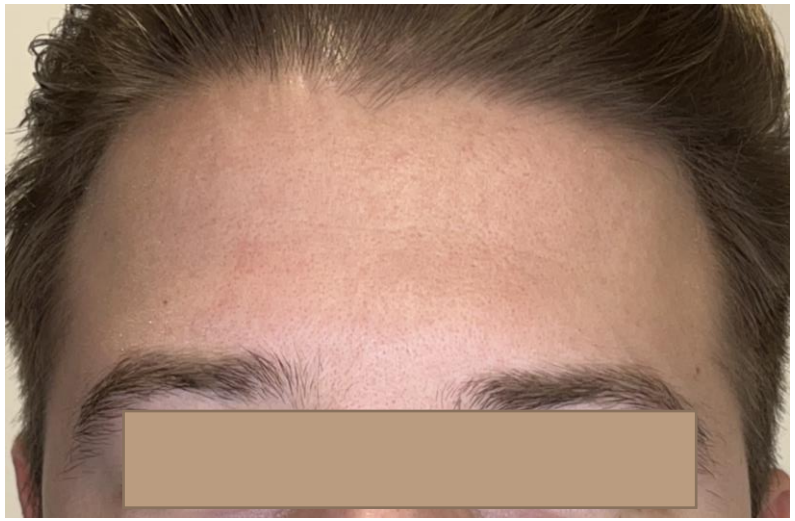
before treatment at maximal eyebrow lift



two weeks after treatment at maximal eyebrow lift

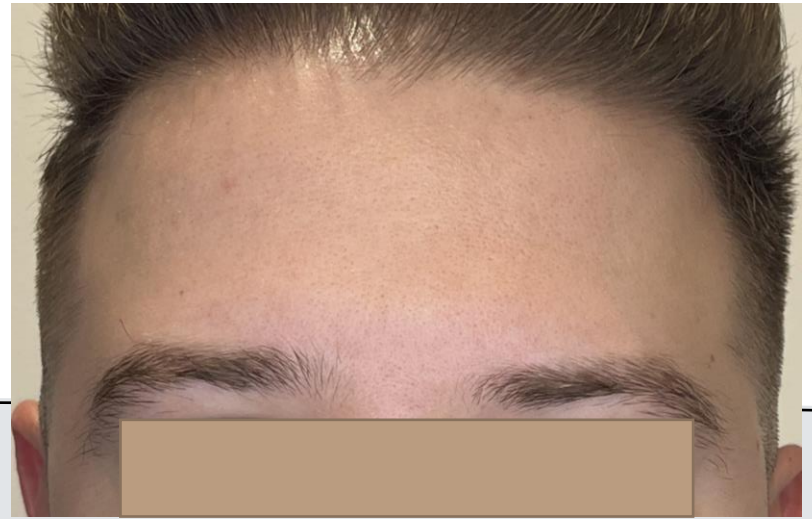
SHORT FOREHEAD, STRONG FRONTALIS MUSCLE

before treatment

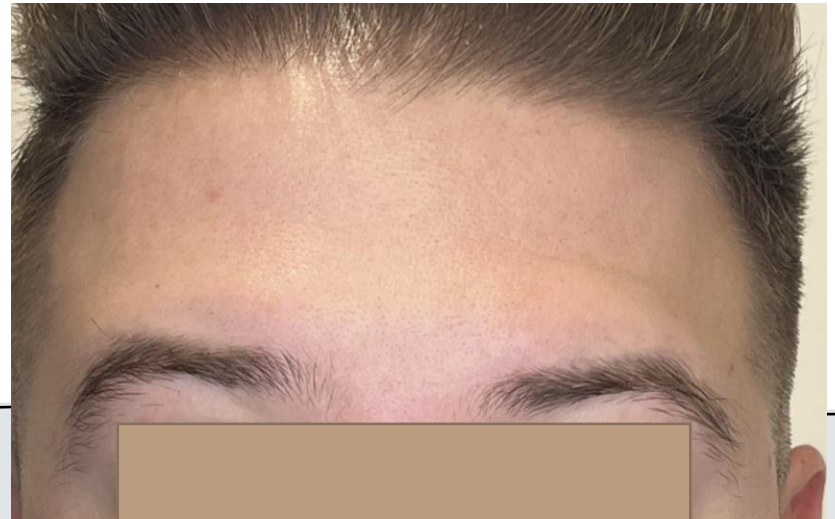


before treatment at maximal eyebrow lift

two weeks after treatment



two weeks after treatment at maximal eyebrow lift



BOTULINUM TOXIN TREATMENT OF THE GLABELLA IN MEN

- 7-point technique (avoiding Mephisto effect)

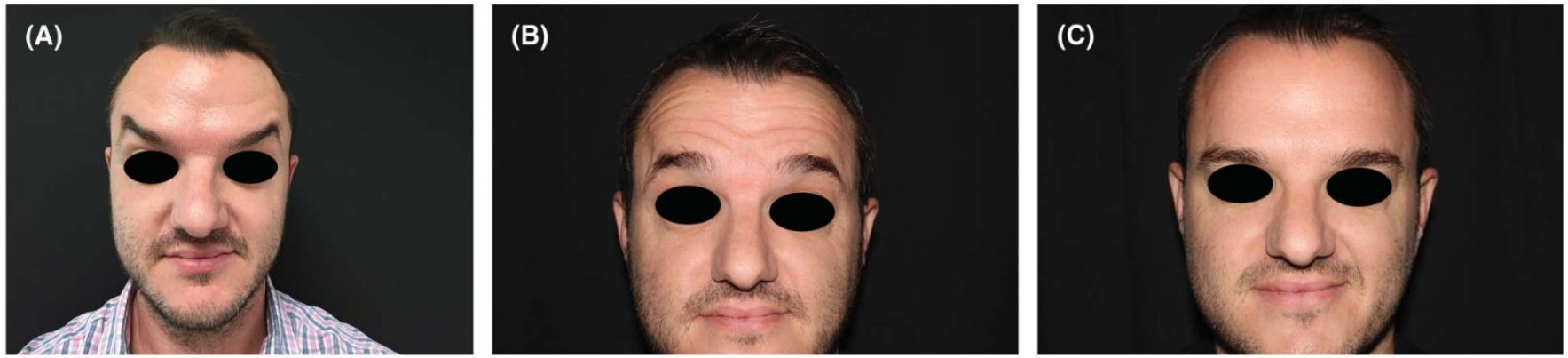
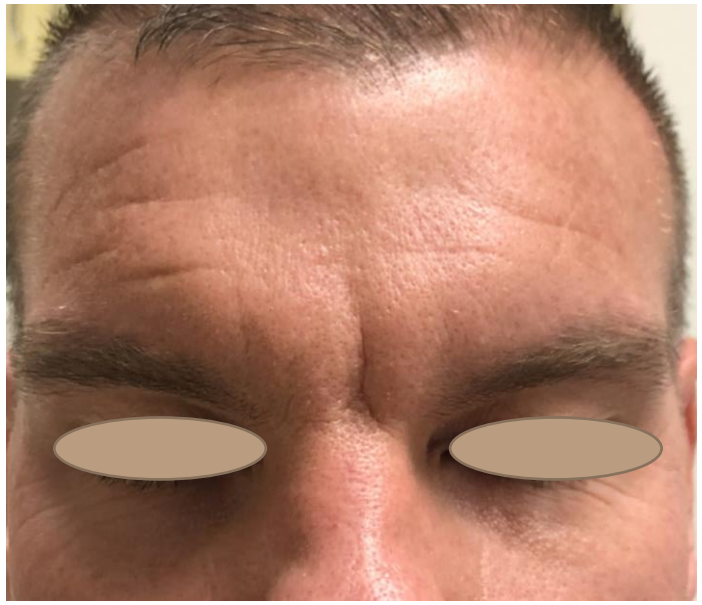


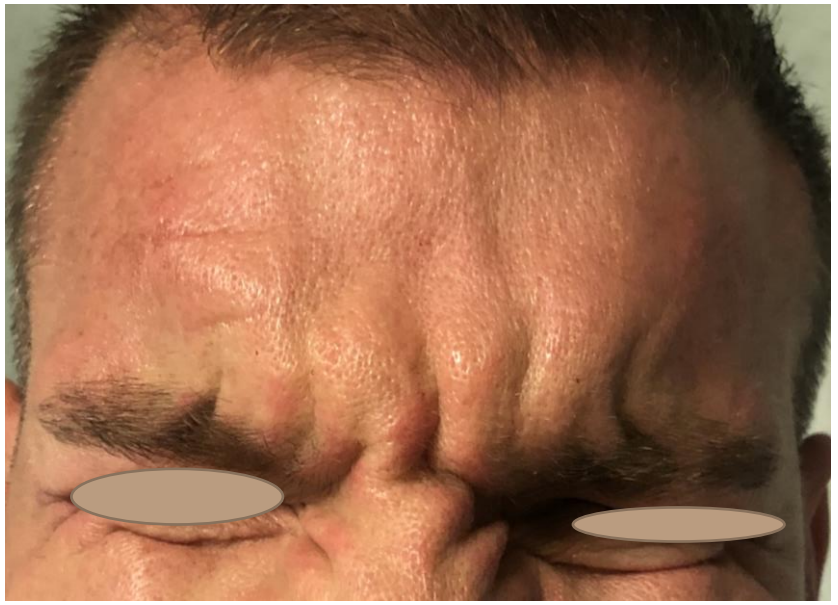
Figure 1. Thirty-six-year-old man at maximal brow elevation (A) treated with BTX by an outside practitioner (dose unknown), presumably in a "V-shape" glabella pattern plus medial frontalis; (B) 9 months after, no BTX, immediately before BTX treatment of procerus, corrugator, and frontalis muscles; (C) 2 weeks after 80 U BTX treatment. BTX, botulinum toxin.

Green, Keaney, Dermatol Surg, 2017

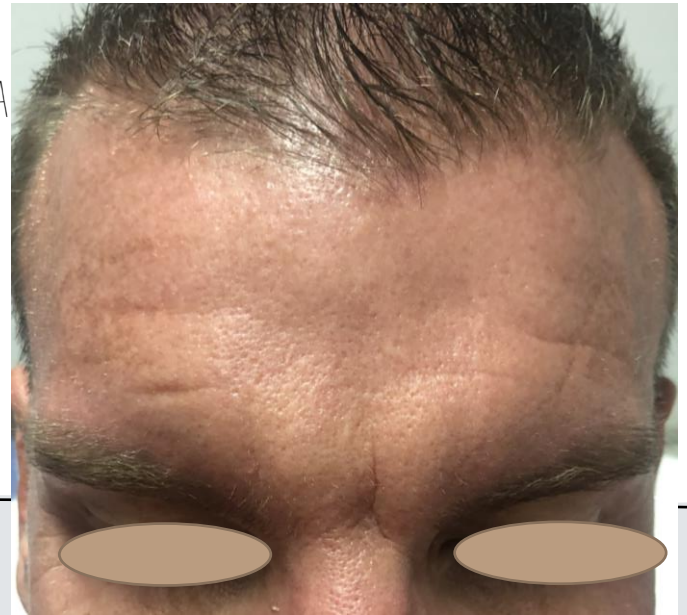
BOTULINUM TOXIN TREATMENT OF THE GLABELLA IN MEN

before the first treatment



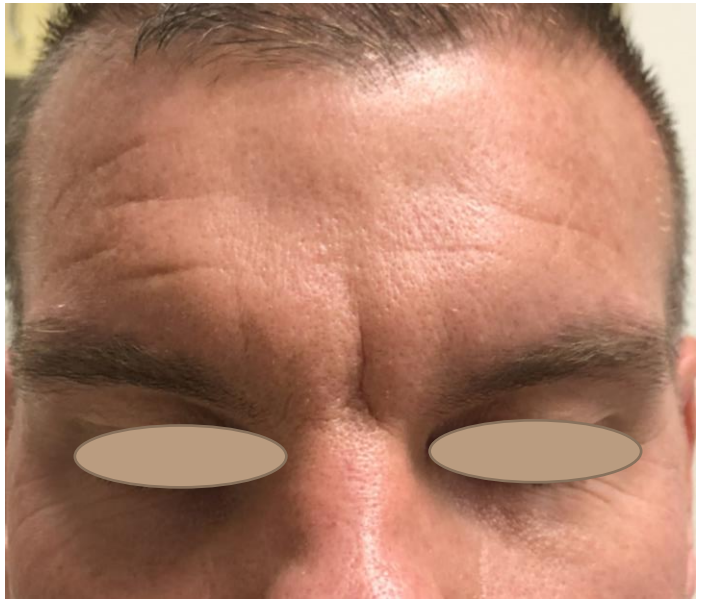


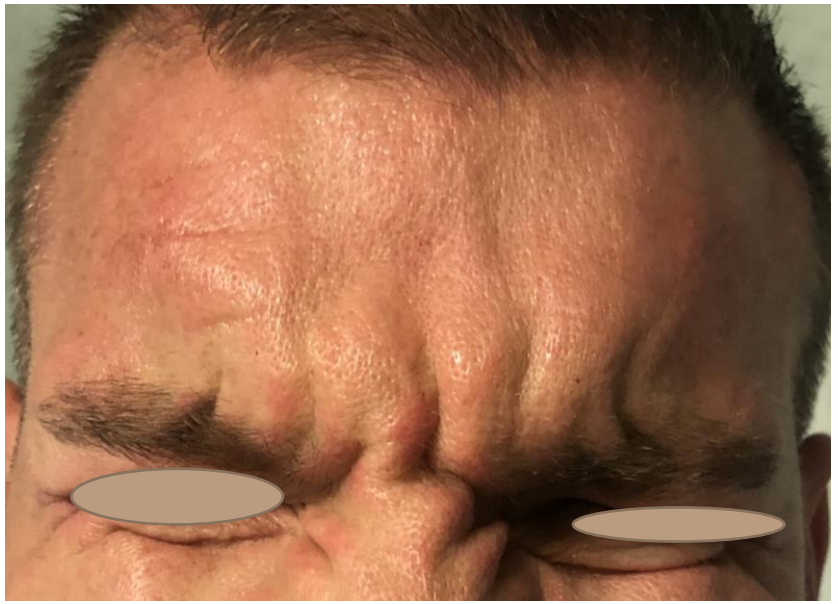
two weeks after Abo-BONT-A treatment



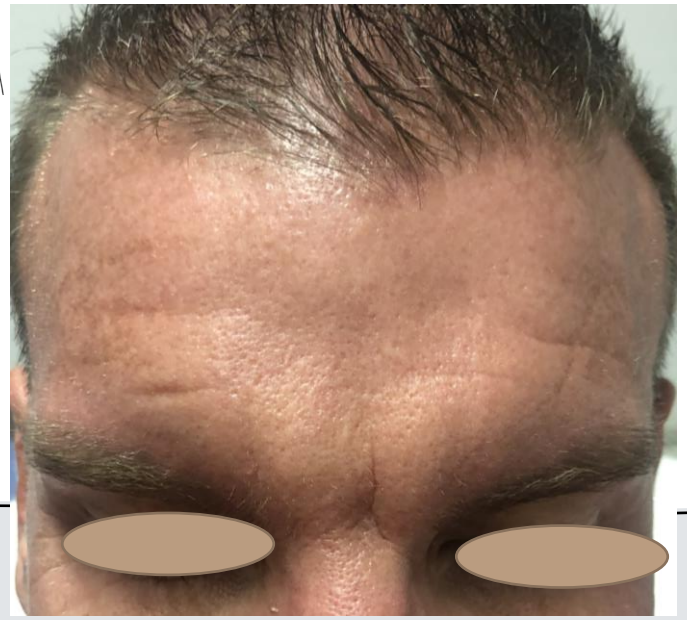
BOTULINUM TOXIN TREATMENT OF THE GLABELLA IN MEN

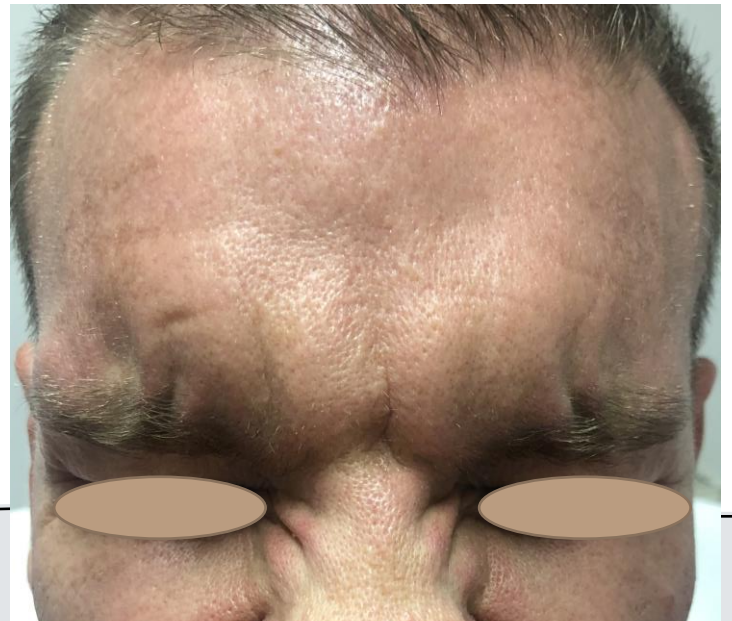
before the first treatment





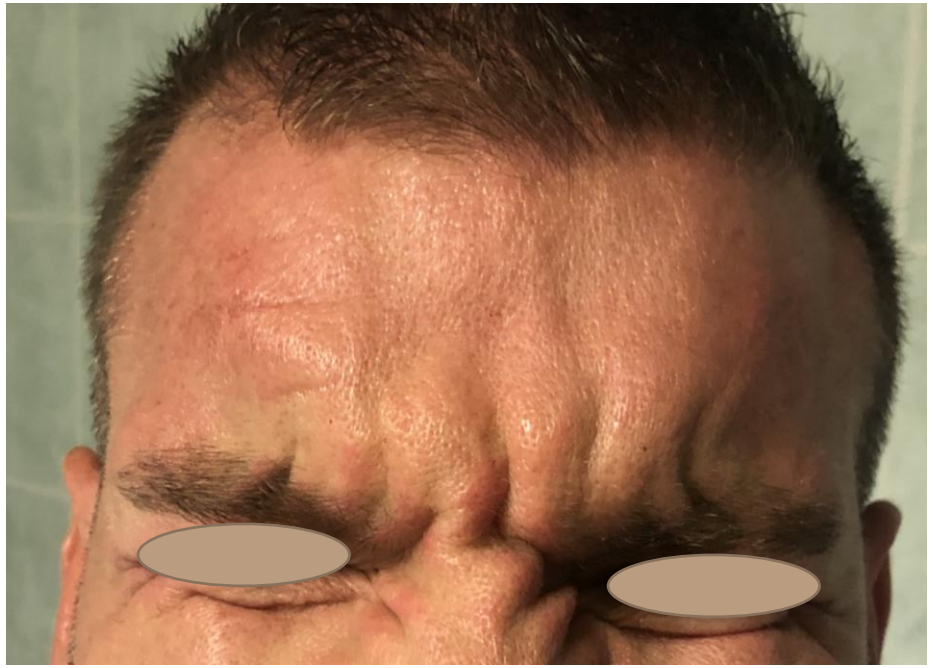
two weeks after Abo-BONT-A treatment



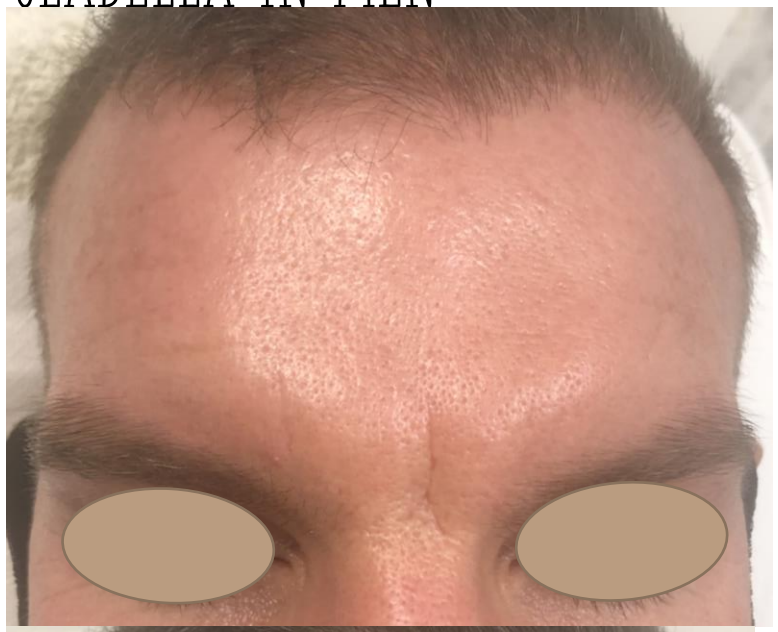


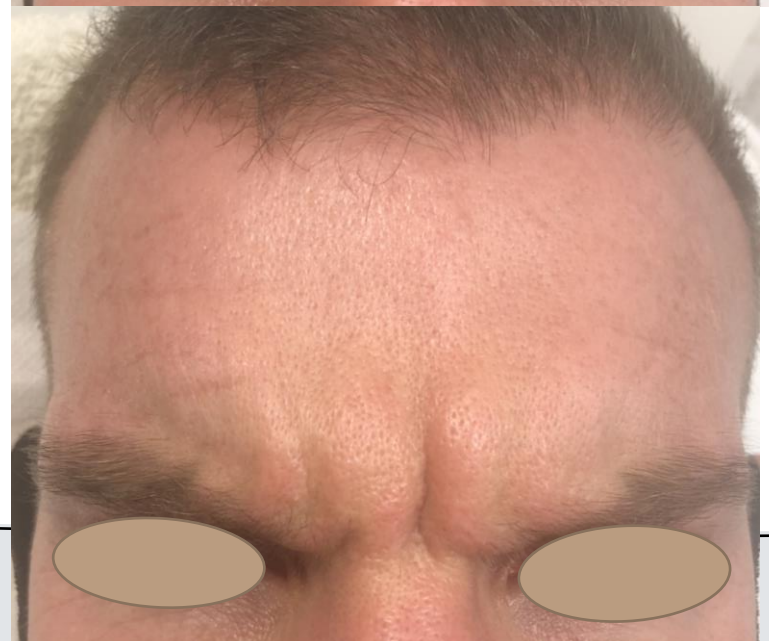
- role of the upper fibers of orbicularis oculi muscle in frowning and producing glabellar wrinkles

BOTULINUM TOXIN TREATMENT OF THE GLABELLA IN MEN



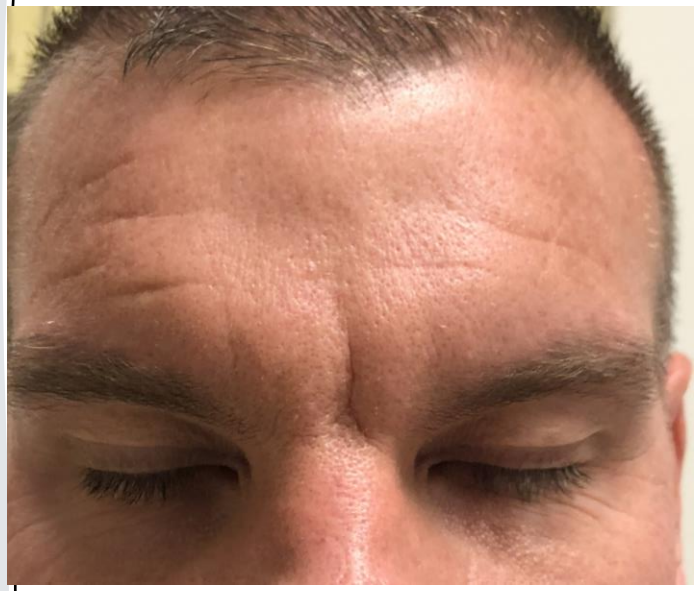
before the first treatment

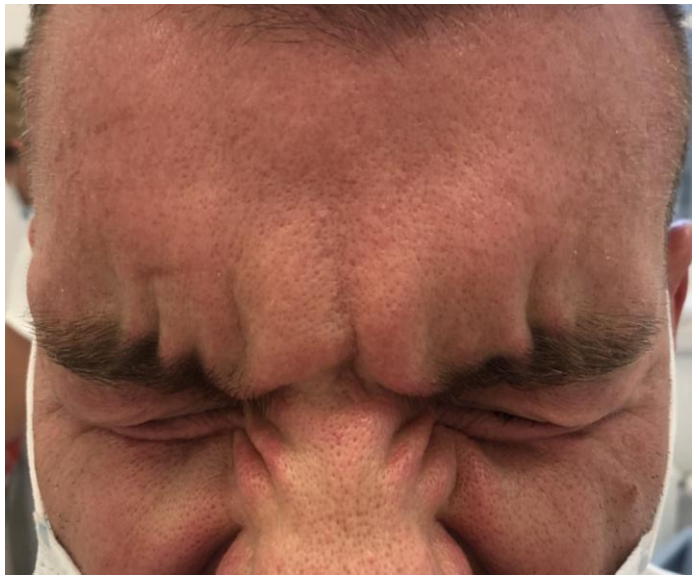


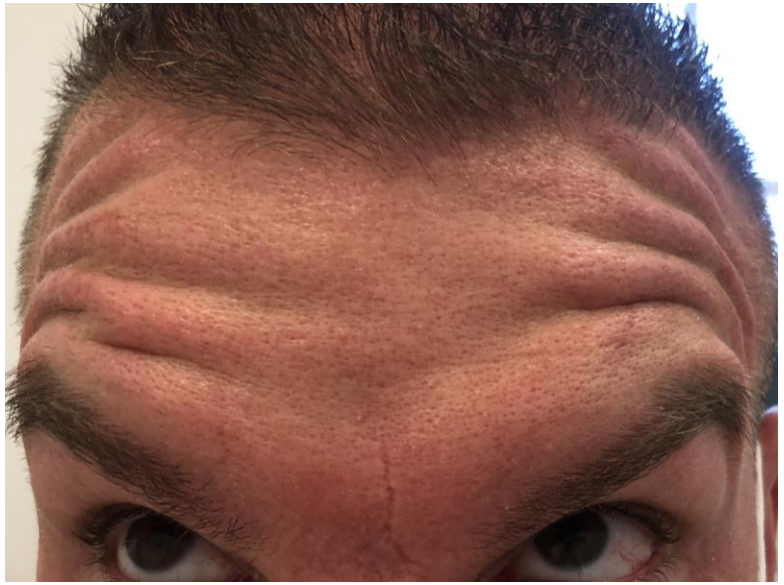


four month after the second treatment

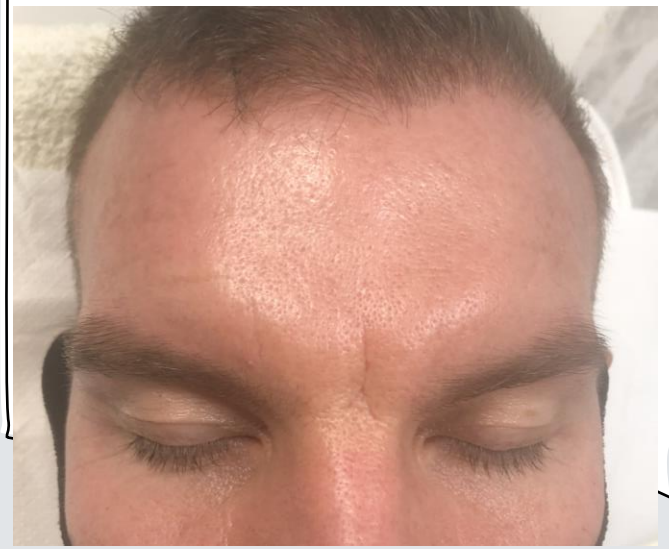
before ABO-BontA treatment

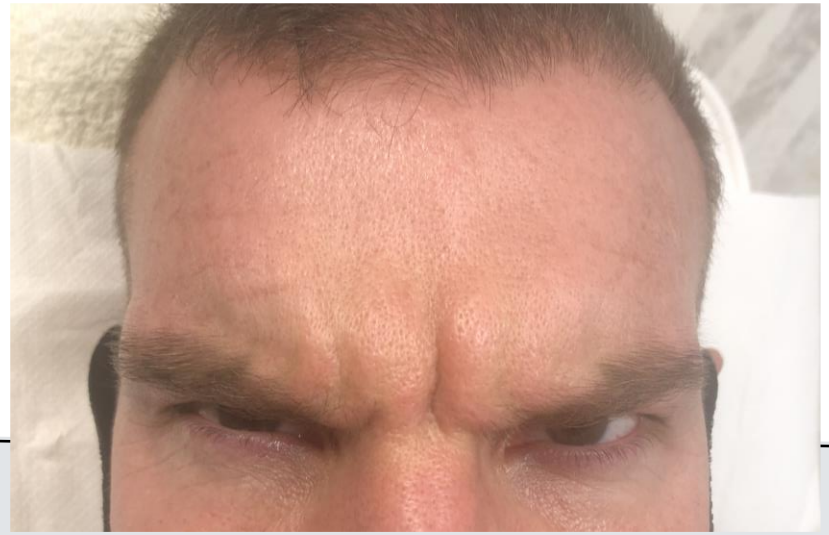


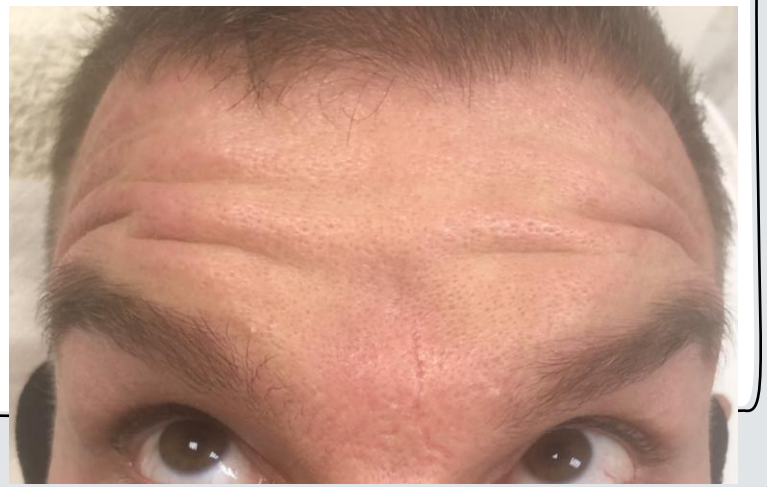




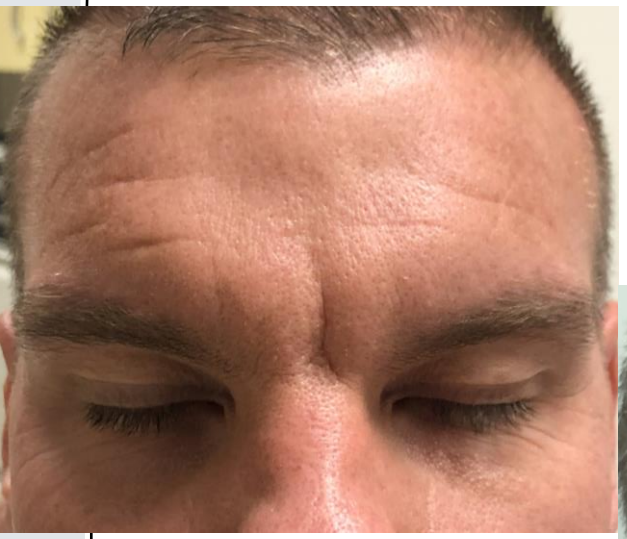
four month after ABO-BontA treatment



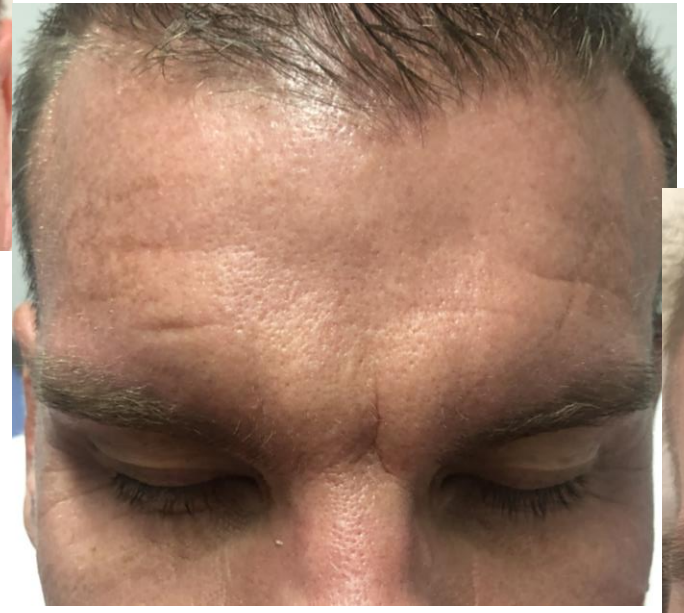




GLABELLA AND FOREHEAD WITHOUT MUSCLE CONTRACTION AFTER REPEATED TREATMENTS

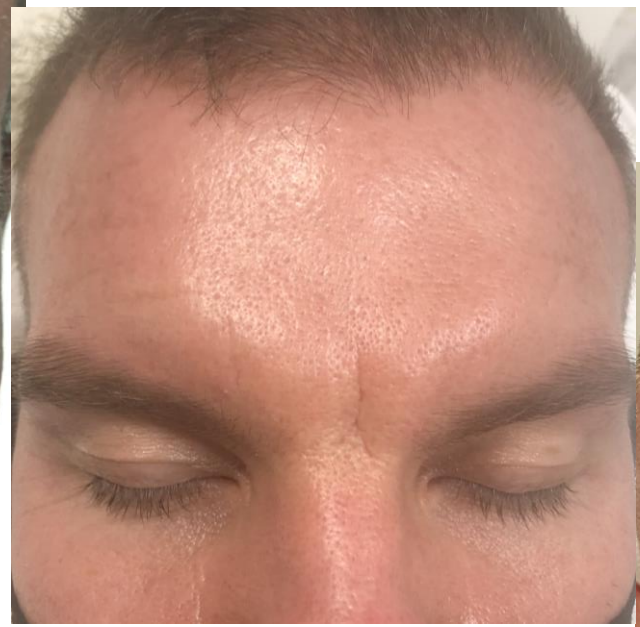


2019

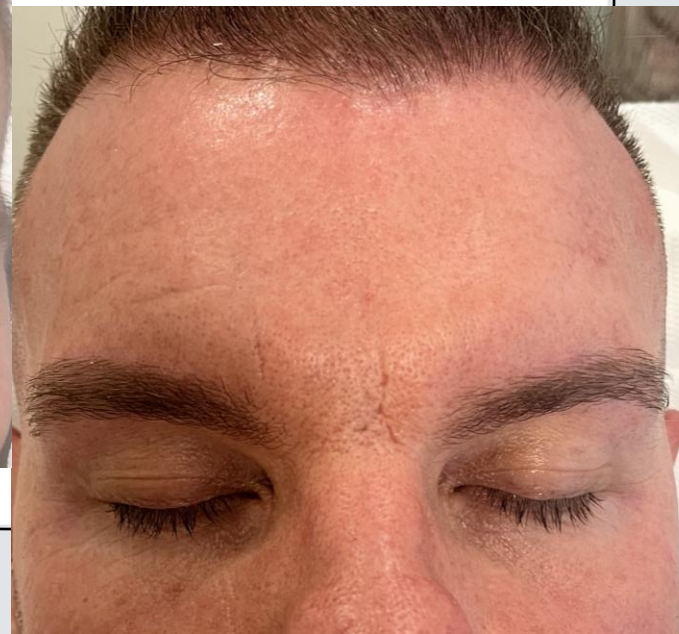


2020

2021



2023



FILLER COMPLICATIONS

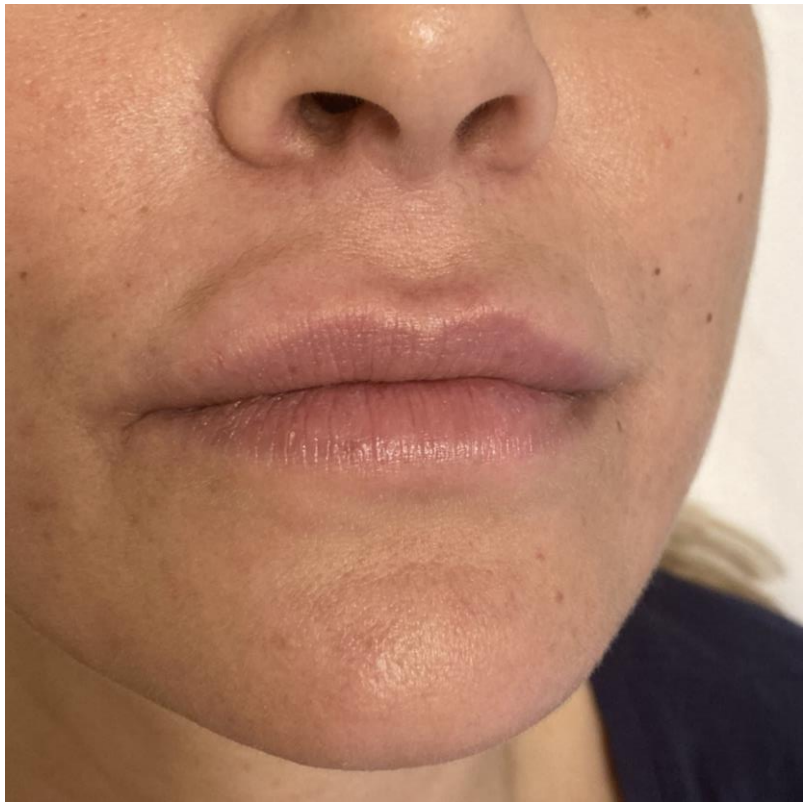
- ecchymosis/bruising, pain
- oedema, erythema
- type I (immediate) allergy
- inappropriate filler position
- scar formation (rarity)
- infection
- granulomatous reaction (delayed type immune reaction)
- peripheral nerve damage
- vascular occlusion (embolisation or compression?)
  - tissue necrosis
  - cerebrovascular insult
  - blindness

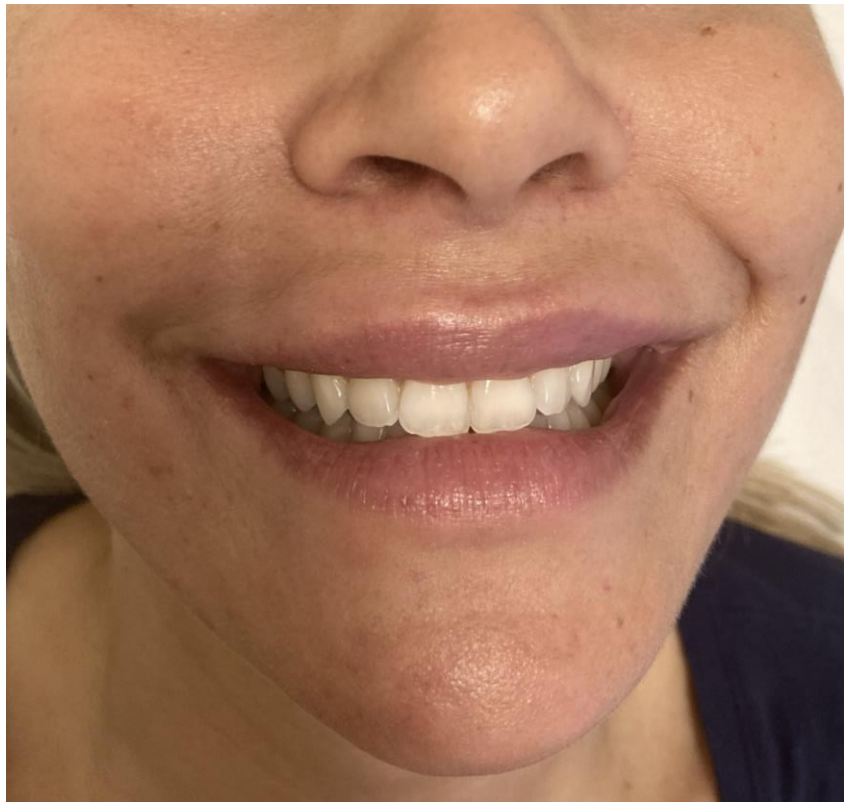
Classification of Soft-Tissue Filler Complications by Onset of Adverse Event

Early reactions
Vascular infarction/soft-tissue necrosis
Inflammatory reactions (acute/chronic)
Infection
Allergic reactions/ hypersensitivity
Injection-related events
Pain
Ecchymosis
Erythema
Bruising
Bleeding
Inappropriate/superficial placement
Distant spread
Late reactions
Inflammatory reactions (acute/chronic)
Infection
Granuloma (typically chronic)
Differential diagnosis
Nodules
Dyspigmentation
Displacement of hyaluronic acid filler material

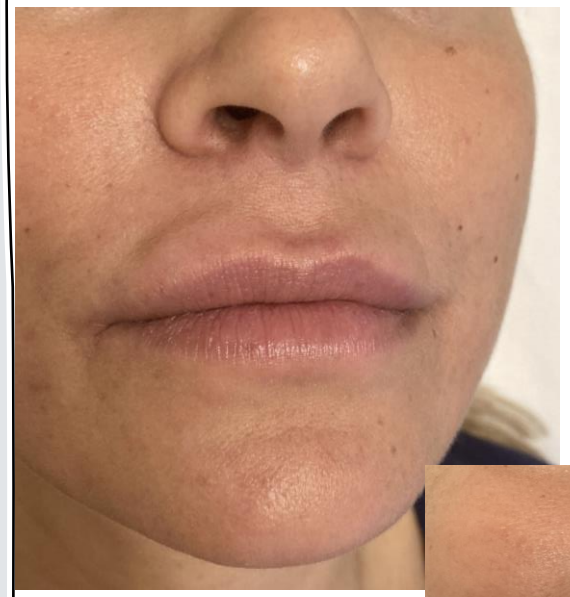
Signorini et al,
GLOBAL AESTHETICS CONSENSUS GROUP
Plast Reconstr Surg, 2016

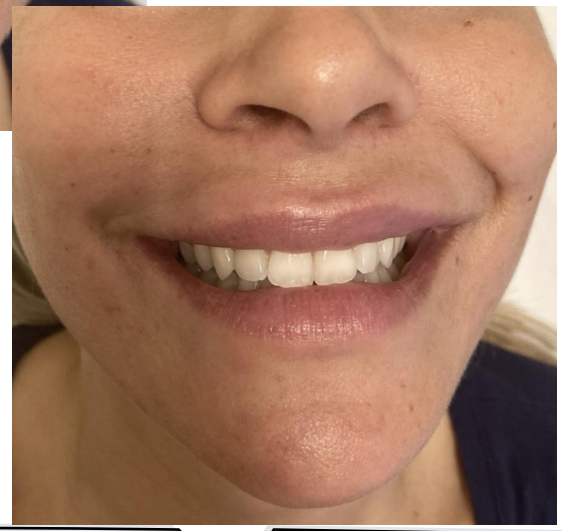
INAPPROPRIATE FILLER POSITION

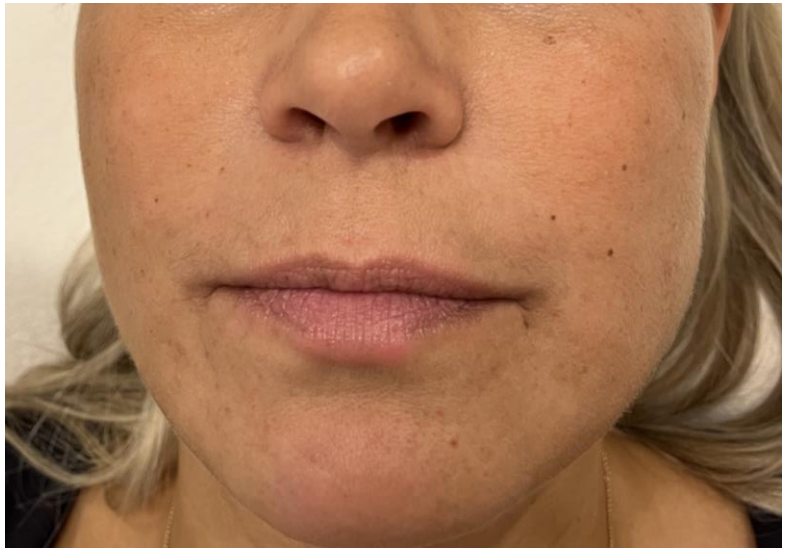


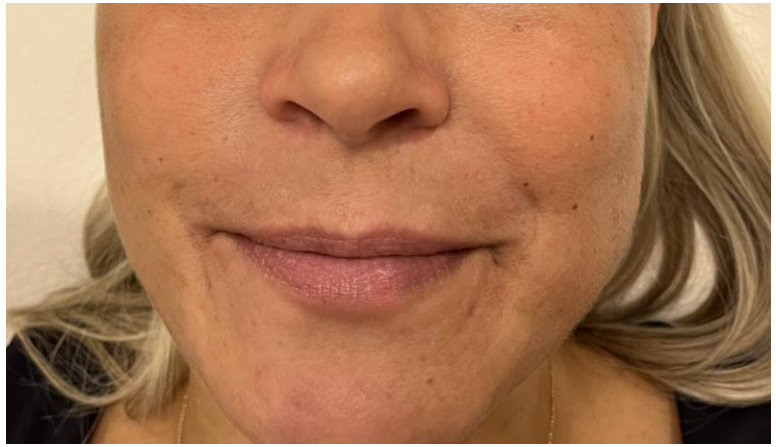


INAPPROPRIATE FILLER POSITION: TREATMENT WITH HYALURONIDASE

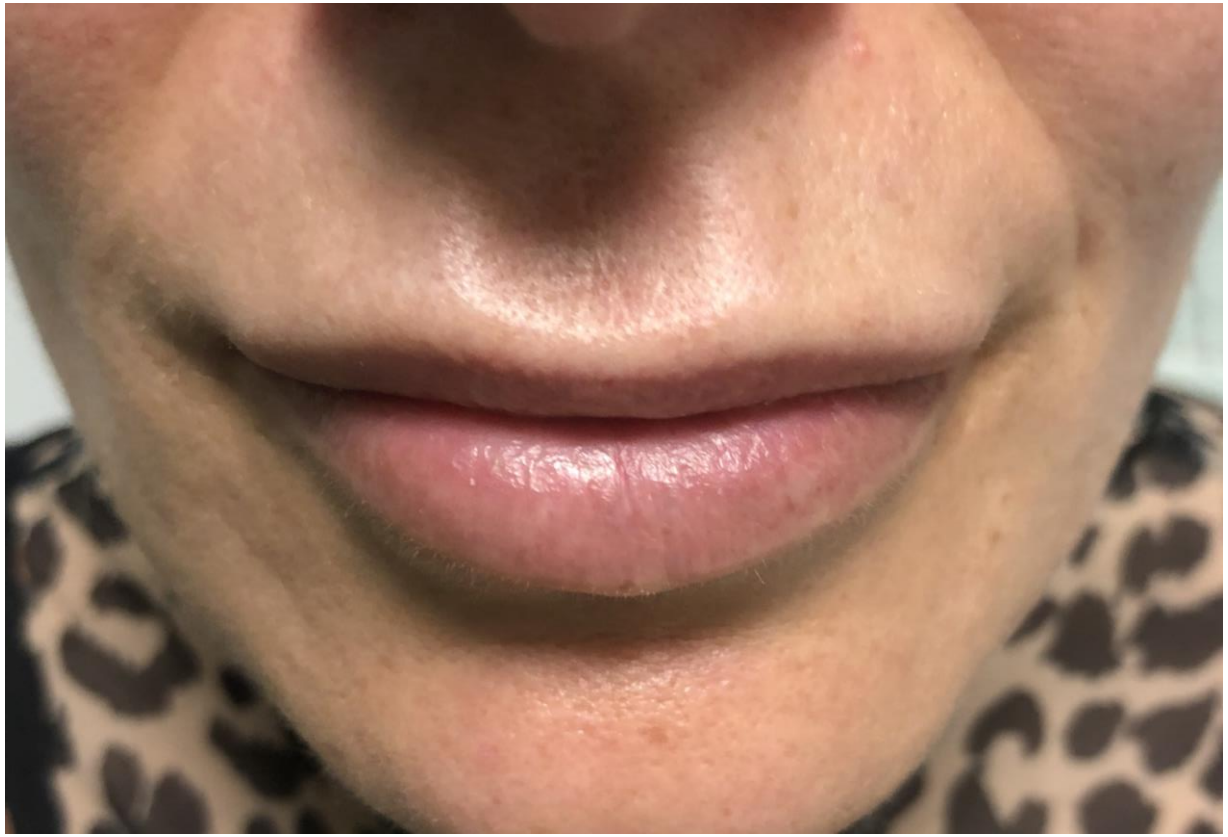




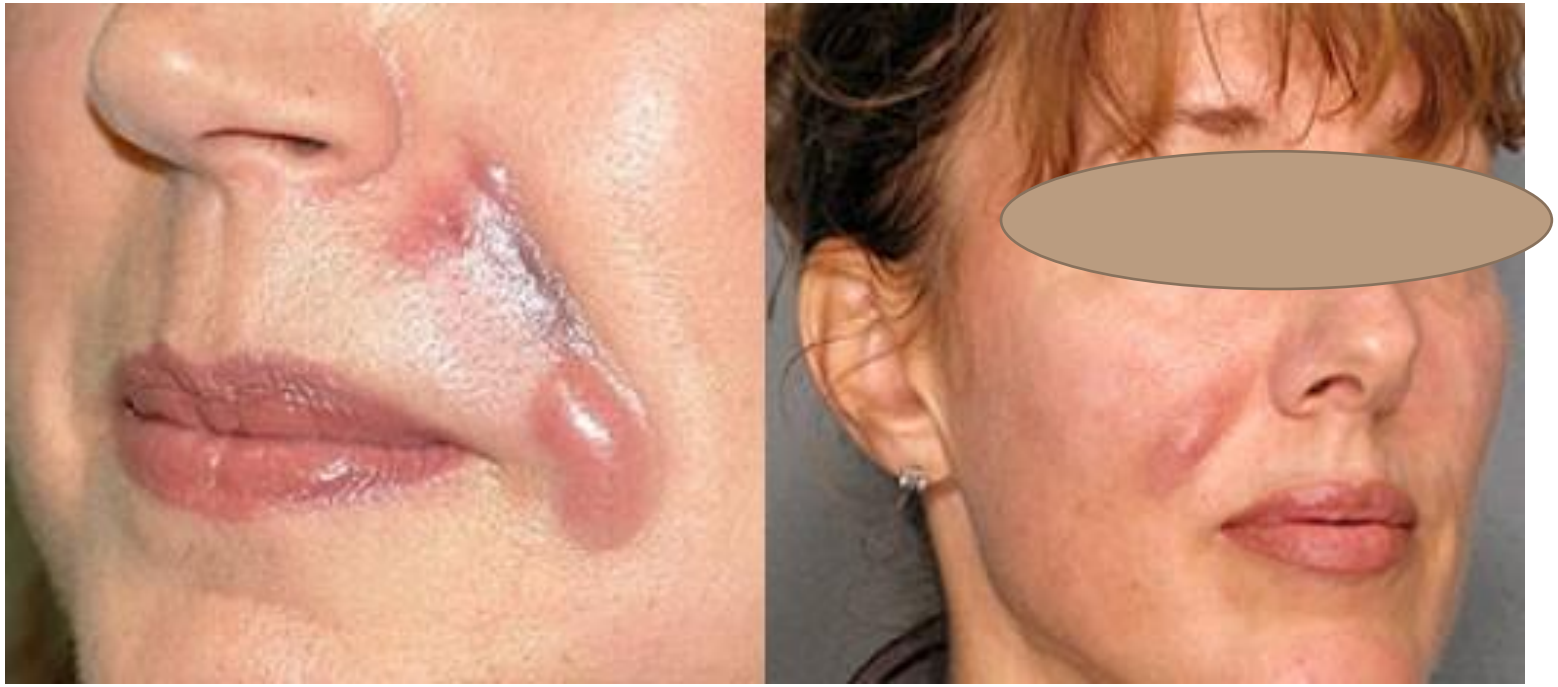




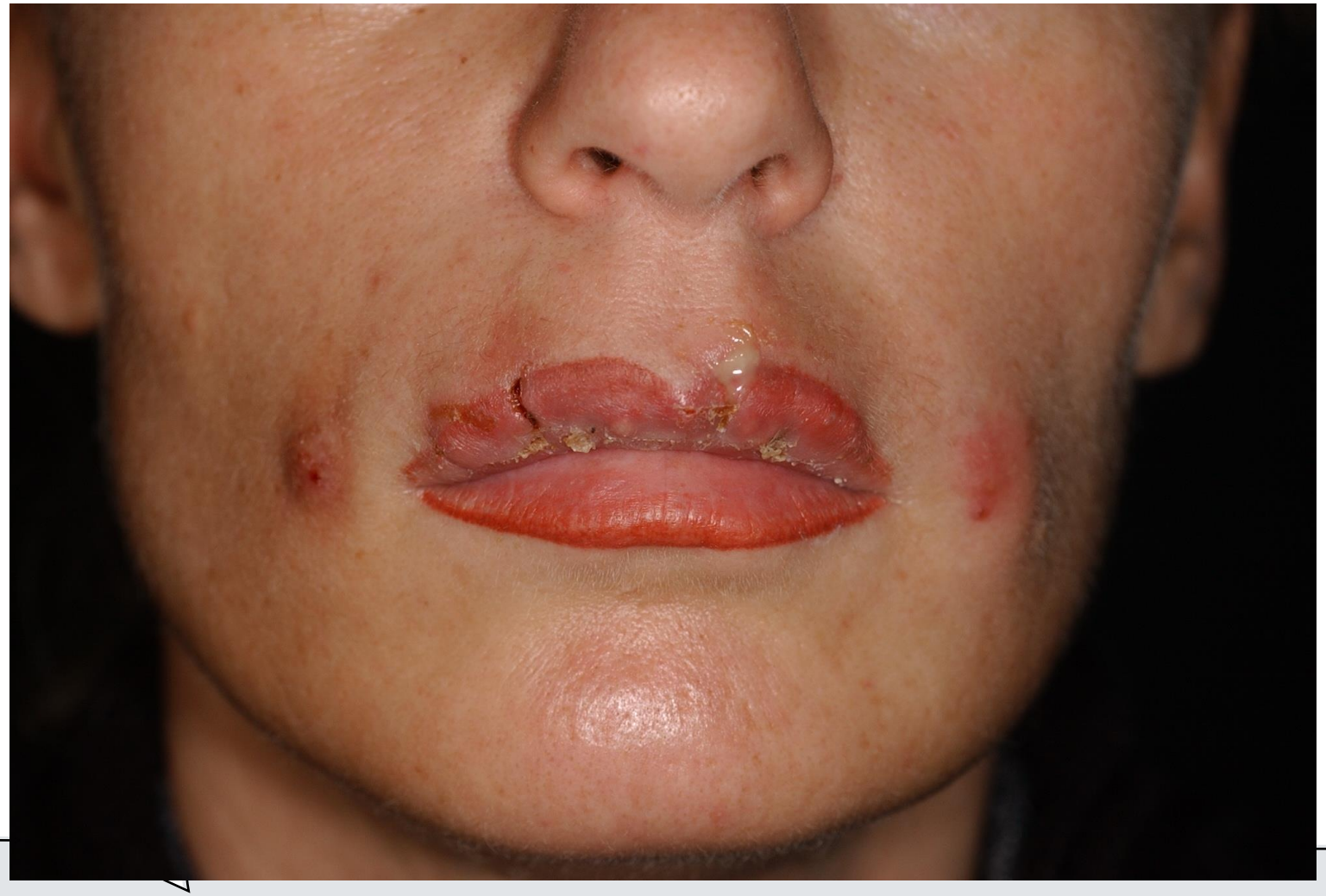
INAPPROPRIATE FILLER PLACEMENT



INFECTION, BIOFILM FORMATION

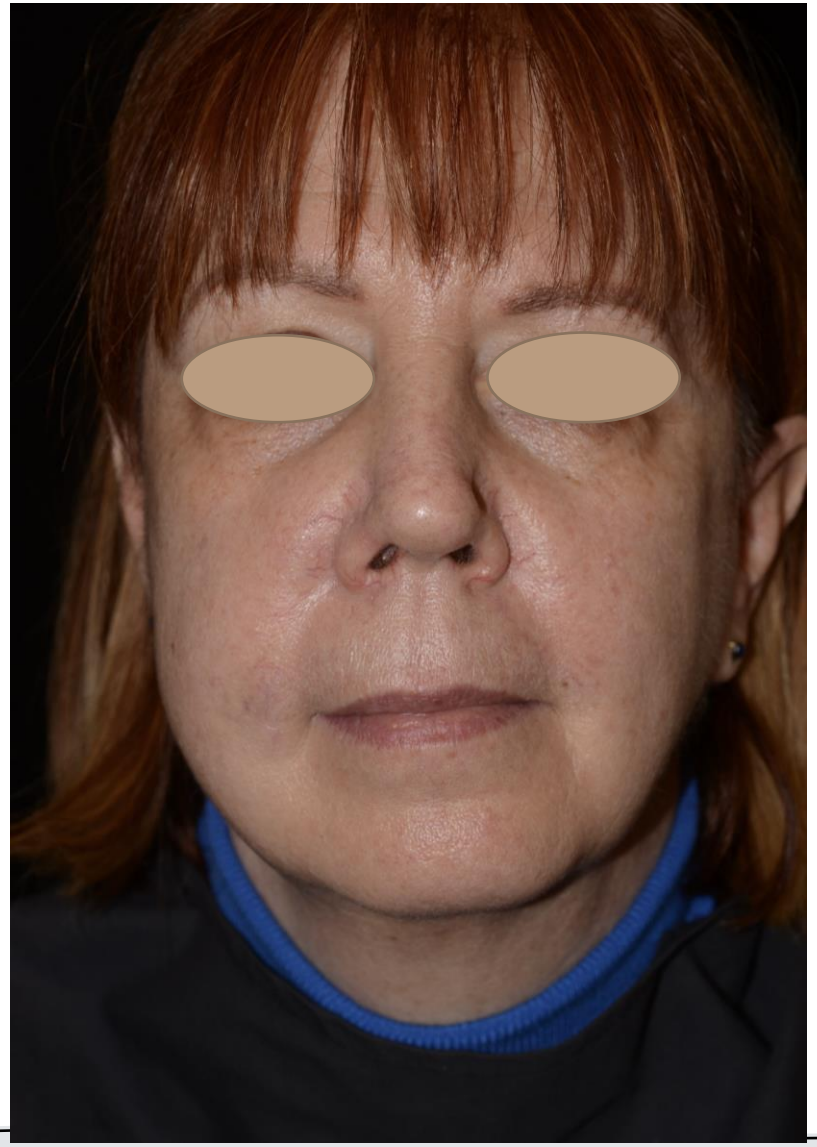


GRANULOMATOUS REACTION



GRANULOMATOUS REACTION

- 15 years after Dermalive permanent filler treatment



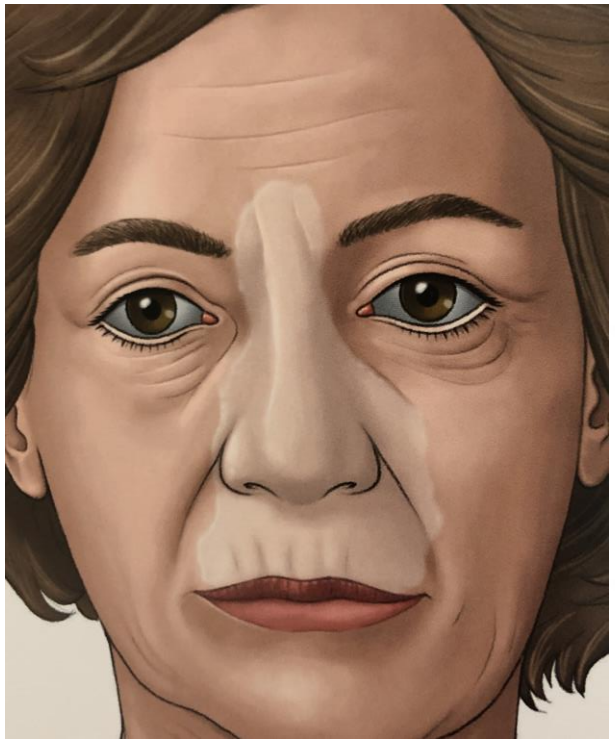
SIGNS OF VASCULAR COMPROMISE DUE TO FILLER INJECTION

arterial occlusion

- pain immediately or within a few hours
- pain not on the site of injection, but on the site of embolus
- sudden whitening of the skin, then cutis marmorata, later livedo reticularis, purple discoloration
- "paupe hat signl": whitening of the white lip, nose, glabella
- Branches of the ophthalmic artery: sudden vision loss, pain, ophtalmoplegia, ptosis

veins

- milder symptoms, trombophlebitis, skin is getting darker, oedema, milder pain

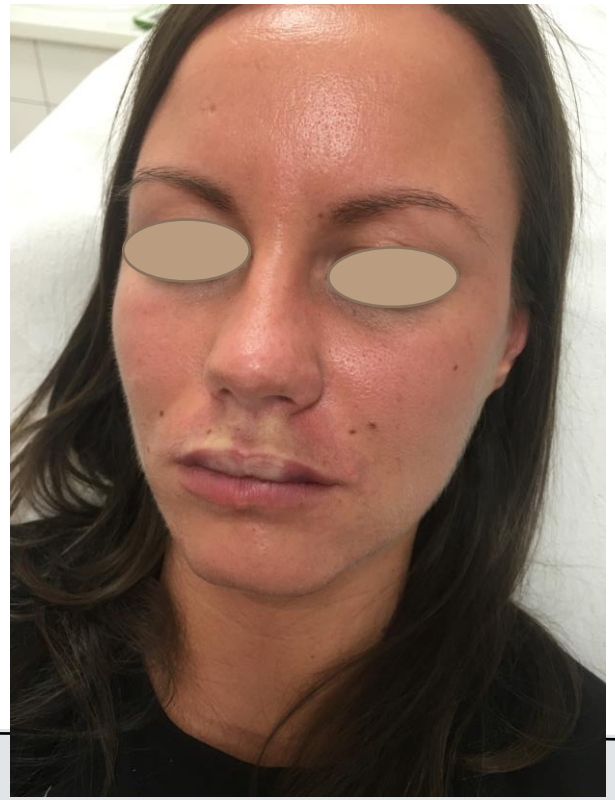


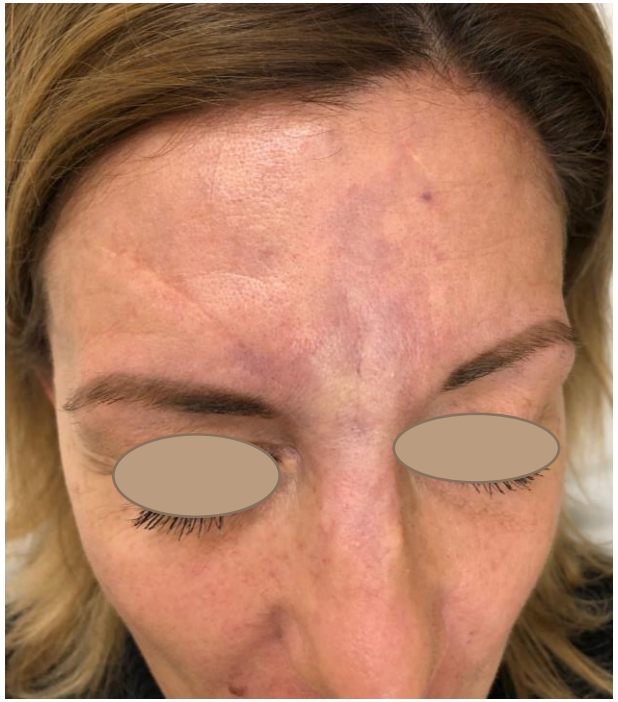
Eckart Haneke, J Cutan Aesthet 2015, Glynis Ablon, Plast Reconstr Surg, 2016 Jack F Scheuer et al Plast Reconstr Surg, 2017, Beleznay et al, Aesthet Surg, 2019

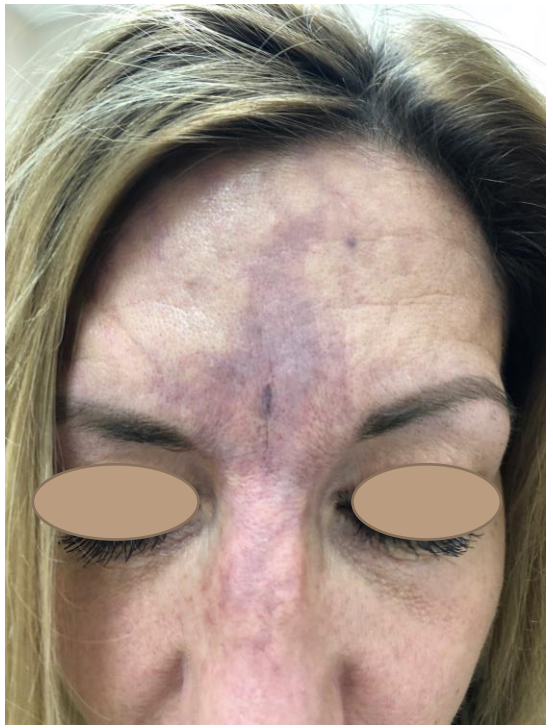
Lamilla, DeLorenzi, Karpova, Rzany, Trévidic: Anatomy and filler complications

ARTERIAL OCCLUSION

- pallor instantly
- livedo reticularis rapidly and last 24–36 h



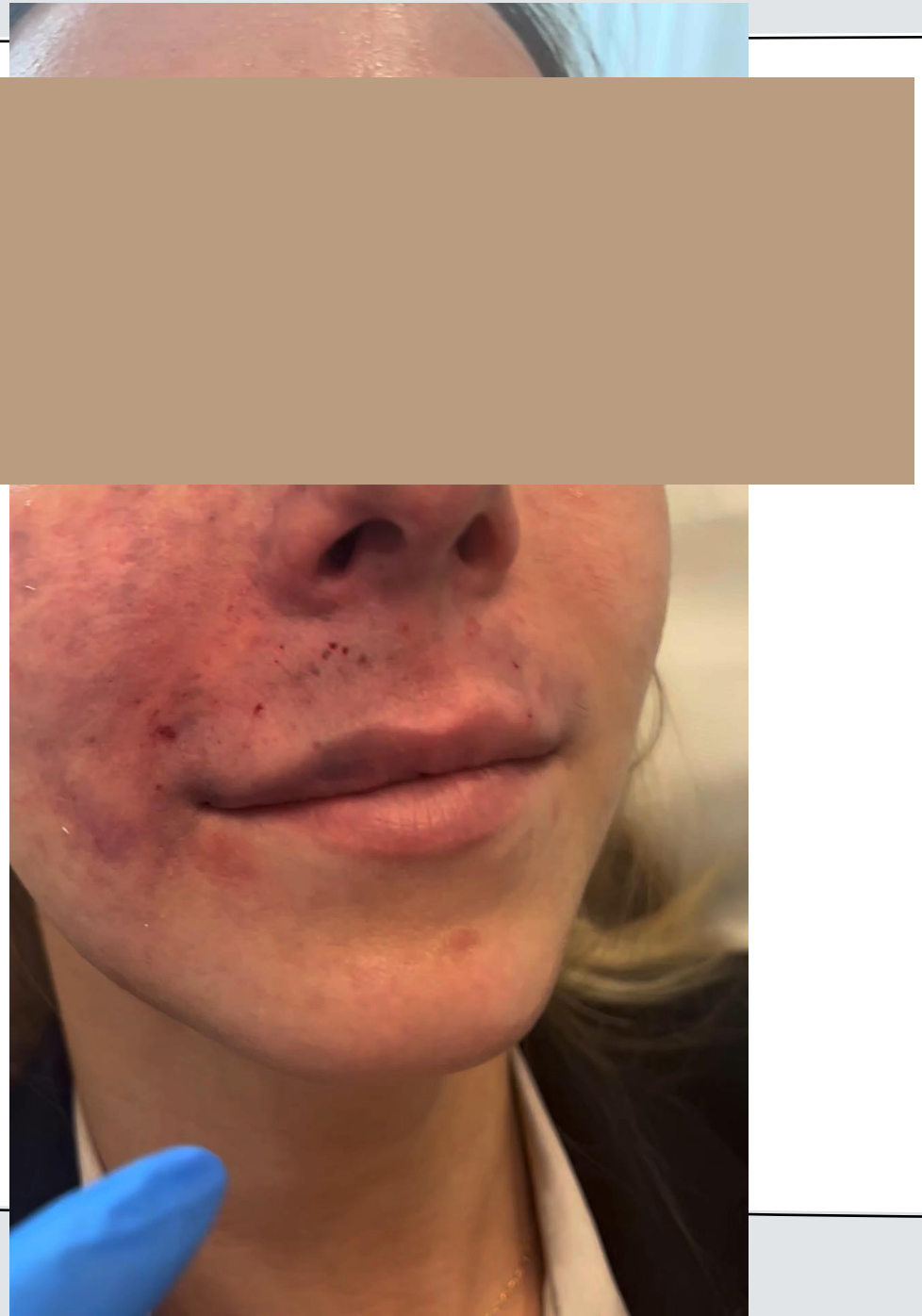




Murray et al, CMAC, JCAD, 2021

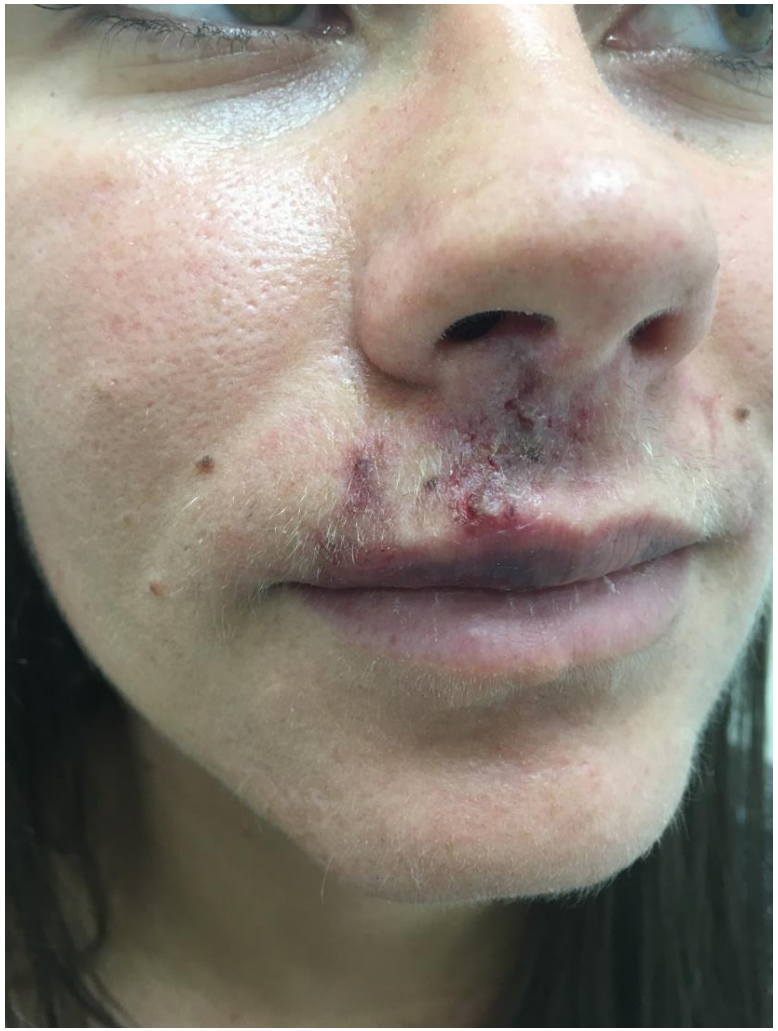
ARTERIAL OCCLUSION

PROLONGED CAPILLARY REFILL TIME (CRT)

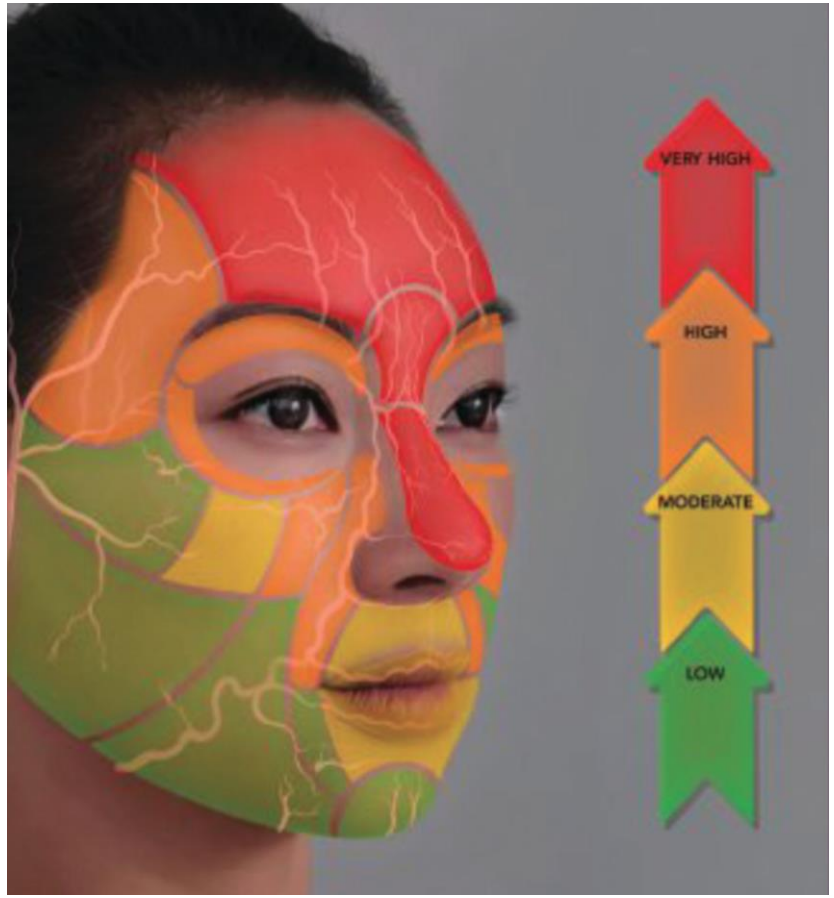


ARTERIAL OCCLUSION

- pustule formation 72 hours after procedure
- coagulation
- soft tissue necrosis days or weeks later
- eschar and eventually scar formation days after procedure
- reperfusion injury



FACIAL AREAS AND ASSOCIATED RISK LEVELS



RISK ASSESSMENT	AREAS OF INJECTION
Very High	Glabella, nose and forehead
High	Temples, nasolabial folds, tear troughs, peri-orbital, medial cheek (between mid-papillary line and side of nose)
Moderate	Lips, perioral region, anterior cheek (between a vertical line through the lateral canthus and mid-pupillary line)
Low	Jawline and marionette, lateral cheek (lateral to vertical line through lateral canthus), sub malar, preauricular, chin augmentation

Murray et al, CMAC, JCAD, 2021

VASCULAR COMPROMISE DUE TO FILLERS: PREVENTION

- detailed knowledge of facial anatomy, 3D!!! (THERE IS NO SAFE!)
- blunt tipped cannula in certain areas (22 G, 25 G)
- aspiration??
- product knowledge
- inject slowly at a a low pressure
- small boluses, avoid large volume boluses
- continuous movement of the tip of the needle
- targeted digital pressure to compress vessels e.g. on the inferior-medial orbital rim and on the nose
- observe the patient (unexpected, unusual pain, skin reaction), communication
- extreme caution in case of previous trauma, surgical intervention

Glynis Ablon, Plast Reconstr Surg, 2016
Jack F Scheuer et al, Plast Reconstr Surg, 2017
Philipp-Dormston et al, JEADV, 2017
Pavicic et al, Plast Reconstr Surg, 2019
Urdiales-González, Aesthetic Plast Surg, 2018
Lee, King, JCAD, 2018, 2020
Murray et al, CMAC, JCAD, 2021

VASCULAR COMPROMISE DUE TO FILLERS: DIAGNOSIS, TREATMENT

RECOGNISE!!! CAPILLARY REFILL TIME! (less than 2 sec)

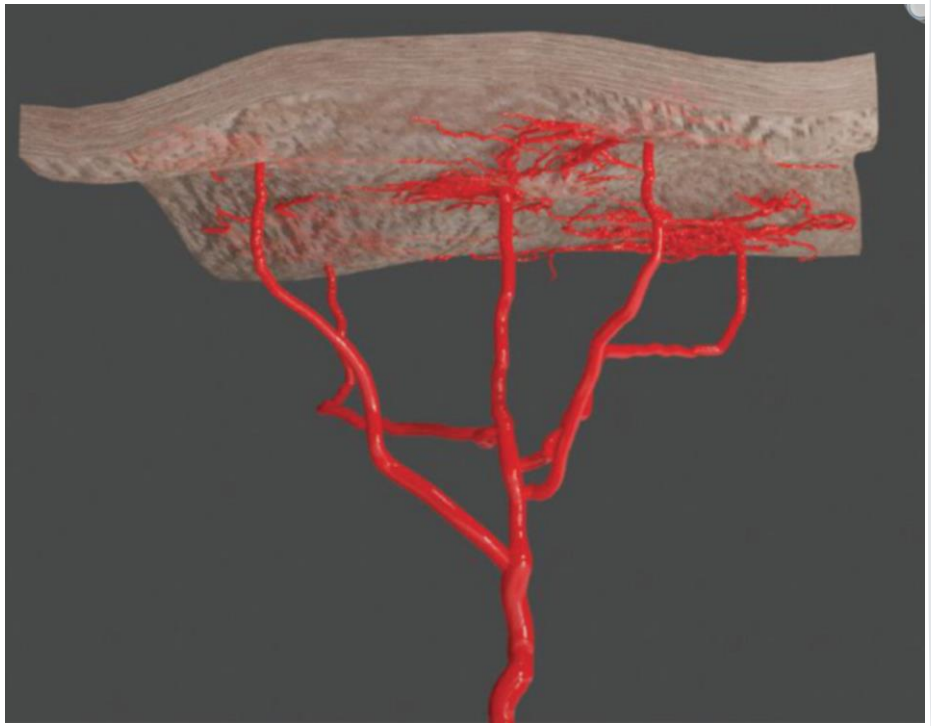
- diff.: bruising, herpes simplex virus infection, zoster

TREATMENT

- the injection should be stopped immediately
- observe CRT prior to treatment (both sides), video
- disinfect, mark the area
- hialuronidase!!! (1500 U + 1 ML 0.9% NaCl or 1-2 % Lidocain treat the whole area
- ultrasound targeted hyaluronidase injection
- massage, apply heat
- sublingval nitrate spray, nitrate skinpatch
- ASA 300 mg on the 1st day, then 75 mg daily
- in 15-20 min, reassess CRT, if > 3 sec, repeat hyaluronidase
- hyperbaric oxygen?
- wound management

Chris Ablon, Plast Reconstr Surg, 2016
Jack F Scheuer et al, Plast Reconstr Surg, 2017
Philipp-Dormston et al, JEADV, 2017
Pavicic et al, Plast Reconstr Surg, 2019
Urdiales-González, Aesthetic Plast Surg, 2018
Lee, King, JCAD, 2018, 2020
Henderson et al, Plast Reconstr Surg Glob Open, 2018

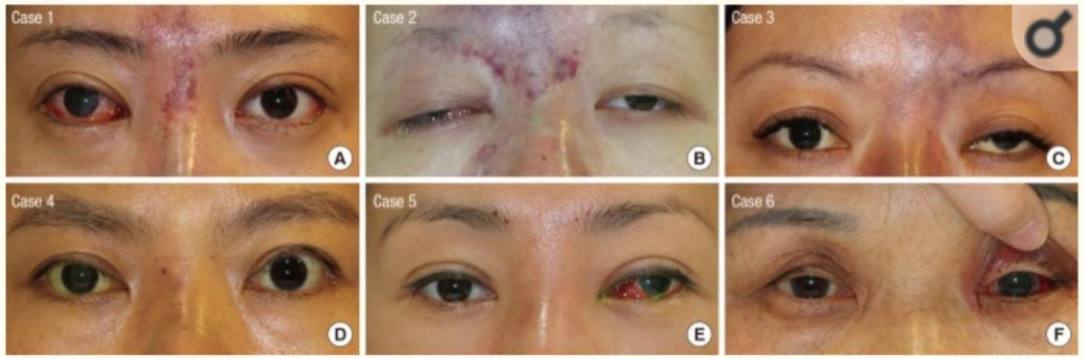
The angiosome



Murray et al, CMAC, JCAD, 2021

VASCULAR COMPROMISE AFFECTING BRANCHES OF OPHTALMIC ARTERY DUE TO FILLERS POSSIBLE SYMPTOMS

- sudden sharp headache, ocular pain
- unilateral (rarely bilateral) usually immediate vision loss
- nausea
- ophtalmoplegia
- ptosis
- strabism
- pupil abnormality
- enophtalmus
- skin reaction (43,8%)



Urdiales-Gálvez et al, 2018
Expert Consensus
K. Beleznay et al, Aesth Surg J, 2019
Mccann, 2019

Kim et al, J Clin Aesthet Dermatol 2015
Chen et al, Facial Plast Surg, 2018
Lee, King, JCAD, 2018

VISION LOSS DUE TO FILLER PROCEDURE: ANATOMICAL AREAS WHERE THE FILLER WAS PLACED

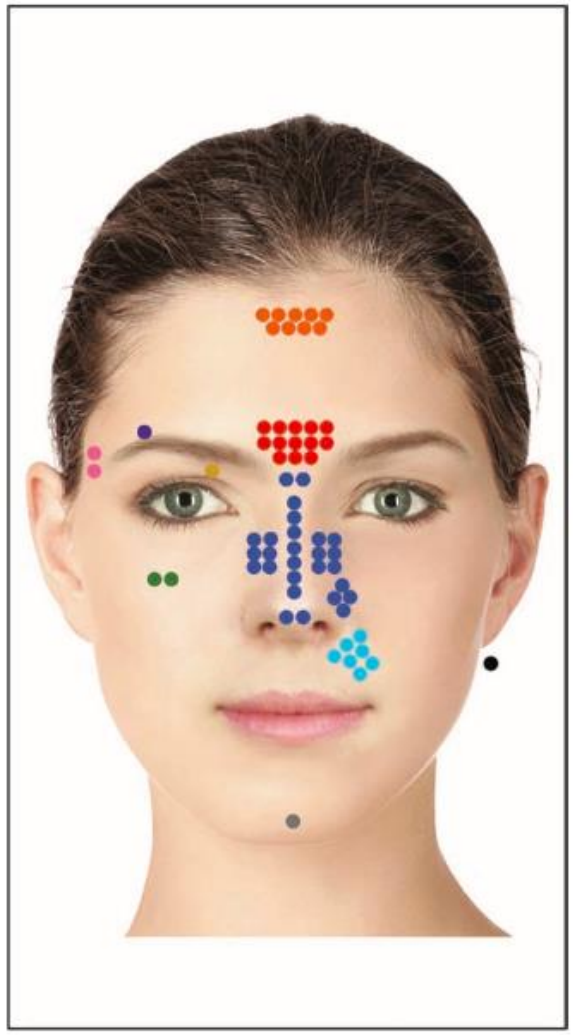


Figure 1. Location of filler injection resulting in visual complication. The single black dot represents a case where the anatomic location of injection was not specified.

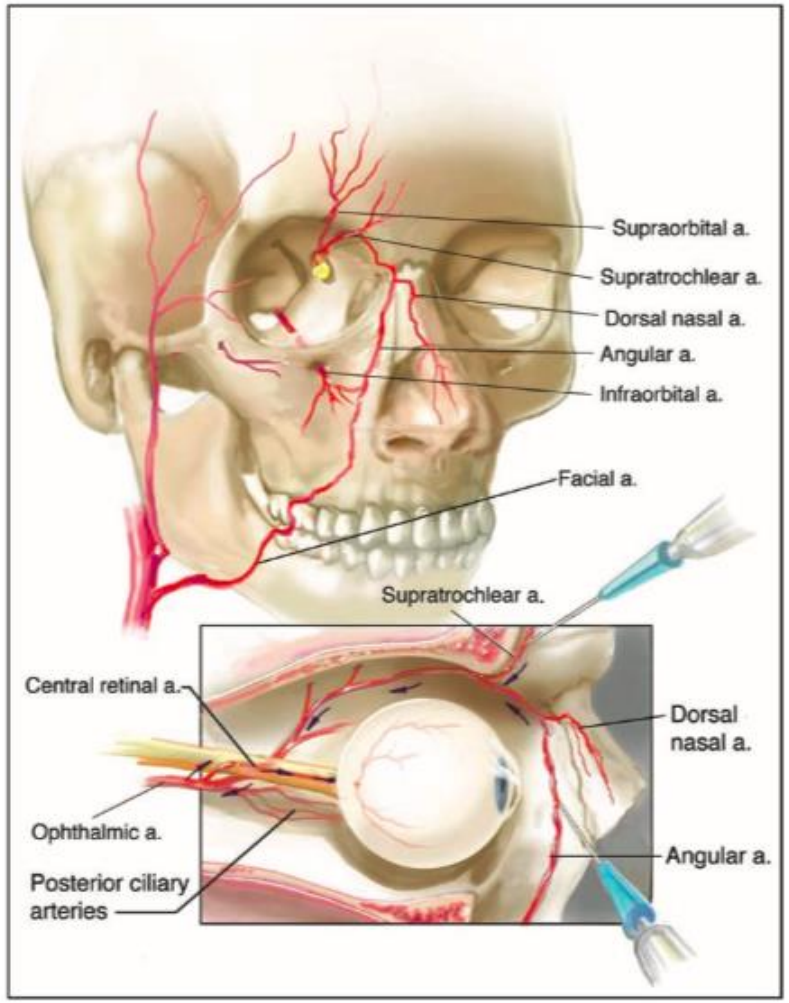
K. Beleznay et al, Aesth Surg J, 2019

Rates of blindness relative to the anatomical zone injected

ANATOMICAL AREA	INCIDENCE 2015	INCIDENCE 2019
Nose	25.5%	56.3%
Glabella	38.3%	27.1%
Forehead	12.2 %	18.8%
Nasolabial fold	13.3%	14.6%

Murray et al, CMAC, JCAD, 2021

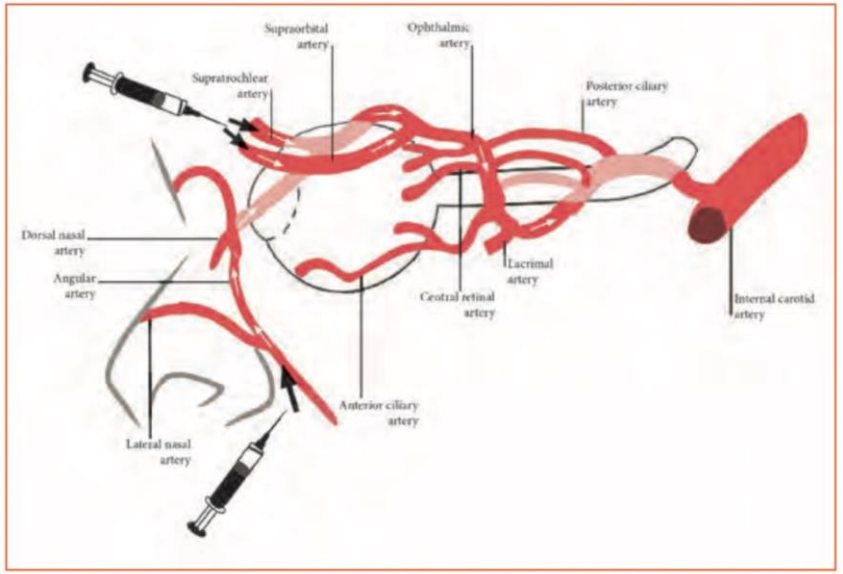
MECHANISM OF VISION LOSS



K. Beleznay et al, Aesth Surg J, 2019

VISION LOSS SECONDARY TO COSMETIC FILLER INJECTIONS

An Aesthetic Complications Expert (ACE) Group Consensus Paper



- Ophthalmic artery occlusion (OAO)
- Generalized posterior ciliary artery occlusion with relative central retinal artery sparing (PCAO)
- Central retinal artery occlusion (CRAO)
- Branch retinal artery occlusion (BRAO)
- Anterior ischaemic optic neuropathy (AION)
- Posterior ischaemic optic neuropathy (PION).

- +/- ophtalmoplegia, +/- ptosis

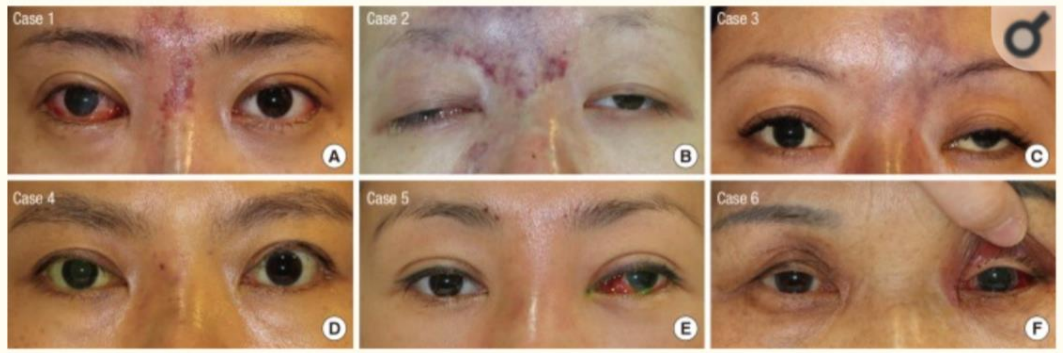
Walker, King, JCAD 2018

VISION LOSS: EMERGENCY INTERVENTIONS

IN OFFICE:

90 minutes, but the first 30 minutes are critical

- stop injecting immediately, don't panic
- alert the ophtalmological unit, ask for immediate transport
- lay down the patient, timolol ocular drops (1-2) only into the affected eye
- 300 mg ASA (continue for 1 week 75 mg daily)
- CO2 rebreathing (rebreathing into a bag)
- sublingual nitrate spray
- vision check, pupil reaction analysis
- ocular massage (until the ophthalmologist doesn't recommend else (pressure for a few mm, 5 sec, then release for 10 sec, closed eyes)
- hialuronidase? if there is skin reaction



OPHTALMOLOGY

- 100 ml 20% mannitol inf.
- iv. acetazolamide 500 mg
- LMWH?, iv. steroid
- retinography
- retro-, or peribulbar hialuronidase 1500 U, repeat
- anterior chamber paracentesis
- hyperbaric O2 ??
- intraarterial thrombolysis is not effective!!

Urdiales-Gálvez et al, 2018 Expert Consensus
Beleznay et al, Aesth Surg J, 2019, M. King,, L. Walker, JCAD, 2020
Mccann, 2019, Kim et al, J Clin Aesthet Dermatol 2015, Chen et al, Facial Plast Surg, 2018, Humzah et al, J Cosmet Dermatol, 2019
AESTHETIC INTERVENTIONAL INDUCED VISUAL LOSS CONSENSUS GROUP

The Journal of Clinical and Aesthetic Dermatology

J Clin Aesthet Dermatol. 2021 Dec; 14(12): E84–E94. PMCID: PMC8794490
PMID: 35096260

Summary of treatments for soft tissue filler induced vision loss

Consensus Opinion for The Management of Soft Tissue Filler Induced Vision Loss

Lee Walker, BDS, MFDS, RCPSG, MJDF, RCS, ENG,[✉] Cormac Convery, MB ChB, MSc, MASLMS, Emma Davies, RN, INP, Gillian Murray, MPharm, PG Dip Clin Pharm, INP, and Brittony Croasdell, MS, FNP-BC, APRN CANS

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CURRENT TREATMENT STRATEGIES	MODE OF ACTION	MECHANISM OF ACTION
Non-pharmacological		
Ocular massage	Dislodge	Repeated compression of the eyeball to dislodge blockage: a sudden drop in intraocular pressure (IOP) with release increases the retinal perfusion
Anterior chamber paracentesis	Reduce intraocular pressure	Extracting 0.1-0.2ml aqueous fluid via needle to reduce IOP and to allow an increase in perfusion pressure
Hyperbaric oxygen	Increase perfusion	Increase oxygen tension and oxygen delivery to ischaemic retinal tissue—involves intermittent inhalation of 100% oxygen under a pressure greater than 1 atm
CO2 rebreathing	Increase perfusion	Rebreathing into a bag produces both hypercapnia which is known to increase retinal blood flow and hypoxia which causes vasodilation. In addition, both hypercapnia and hypoxia can increase cardiac out-put and raise systemic arterial blood pressure, which in turn, increases ocular perfusion pressure.
Pharmacological		
Timolol drops	Reduction in intraocular pressure	Suppress aqueous humour formation, reduce IOP and increases perfusion
IV Mannitol, Acetazolamide	Reduce intraocular pressure	Medication used in glaucoma to reduce intraocular pressure
Aspirin	Prevents clot formation	Prevents platelet aggregation, allowing body to breakdown embolus element of blockage
Topical and systemic steroids	Reduce intraocular pressure	Reduction in vascular endothelial oedema
Sublingual isosorbide mononitrate	Increase perfusion	Causes a mild decrease in intraocular pressure along with corresponding dilation of retinal vasculature and increased perfusion in the retinal artery

EMERGENCY KIT

- hyaluronidase (> 3000 U)
- Tonogen/adrenaline
- ASA
- timolol 0.5% ocular drops
- IOPIDINE (apraclonidine) ocular drops (in case of ptosis due to botulinum toxin treatment)
- set for venal infusion, cristalloid
- nitrate sublingual spray/tabl. /patch
- steroid, antihistamine
- warming package
- plastic or paper bag
- resuscitation masque
- needles, syringes (1 ml, 10 ml)
- check the kit every month

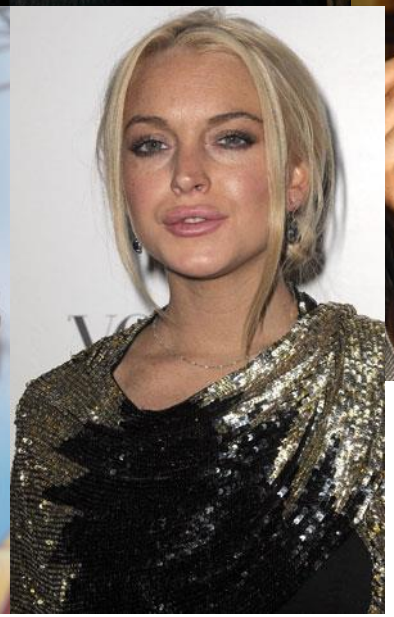
Humzah et al, J Cosmet Dermatol, 2019
AESTHETIC INTERVENTIONAL INDUCED VISUAL LOSS CONSENSUS GROUP
Prado, Rodriguez-Feliz, Aest Plas Surg, 2017
Martyn King, J Clin Aesthet Dermatol, 2018

FILLERS: PREVENTION OF COMPLICATIONS

- deep understanding of 3D anatomy
- check patients medical history
- patient selection, indication
- technique: correct plane, inject slowly, blunt tip cannula in some anatomical region (25 G, 22G)
- pay attention to the patients' reactions, skin, pain
- product selection depending on the indication (rheological properties, cutting edge quality), correct amount of product

LIPS APPROPRIATE TO AGE?

BEAUTY = WRINKLE-FREE?



http://www.youngeryou.com.au/news-features/celebrities/
http://www.msnbc.msn.com/id/34462651/

NON DYNAMIC FILLER IN A DYNAMIC AREA: UNNATURAL APPEARANCE

AGE-APPROPRIATE HARMONY