Illustrated Atlas of Aesthetic Augmentation Procedures with Fillers

Dosage | Localisation | Application

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Contents

2 Anatomy and ageing of the face

In aesthetic dermatology, the face has always been the focus of treatments aimed at enhancing attractiveness. With the increasing demand for such procedures, research interest has also grown, leading to a greater understanding of the anatomical structure of the face and the causes of age-related changes. This knowledge has contributed to a paradigm shift in aesthetic medicine, leading to a significant move over the past two decades towards restorative, minimally invasive procedures instead of destructive surgical techniques.

This change has been driven by the growing understanding of the importance of subcutaneous fat and its (circulation-related) atrophy in the ageing process. To treat this volume deficit and imbalance while protecting the tissue, minimally invasive techniques, above all the use of water-binding fillers, gained in importance.

Thanks to advances in clinical practice, scientific research and industry, the methods have been further developed and revolutionised over time.

Today, deep augmentation techniques are a standard method for addressing age-related changes throughout the face, offering a holistic therapeutic approach to treating soft tissue changes.

To apply these treatments effectively, it is important for practitioners to understand the clinical and anatomical factors, which are described below.

2.1 Faces and attractiveness

The face is what makes a person unmistakably recognisable and is at the centre of their social interactions. It serves not only as a conscious medium for verbal and non-verbal communication but also passively facilitates a constant exchange of highly personal information. However, the information provided does not necessarily have to be intended for others. For example, facial features reveal something about age, mood, state of stress and recovery as well as general physical and mental condition. Involuntarily, an opinion is formed about the person's personality and a decision is made as to whether the person is perceived as likeable or unlikeable. No other region of the human body is of comparable emotional and social importance. In addition, nowhere else do the consequences of premature ageing processes become apparent as early and as severely as on the permanently exposed face.

Comparison of attractive vs. unattractive faces

Fig. 2.1 "Morphed" prototype of the female "attractive" face (left) compared to the "unattractive" prototype (right) according to Braun et al. (2001). The artificial faces were generated using a mathematical calculation of the average face derived from many different original faces, which had previously been assessed and ranked for attractiveness. By directly comparing different pairs of faces, the key features that distinguish an attractive face from an unattractive one could be identified. Homogeneity of the surface (skin) and approximation to the baby schema were identified as the main criteria for increased attractiveness. Average proportions and symmetry, on the other hand, turned out to be marginal criteria of attractiveness.

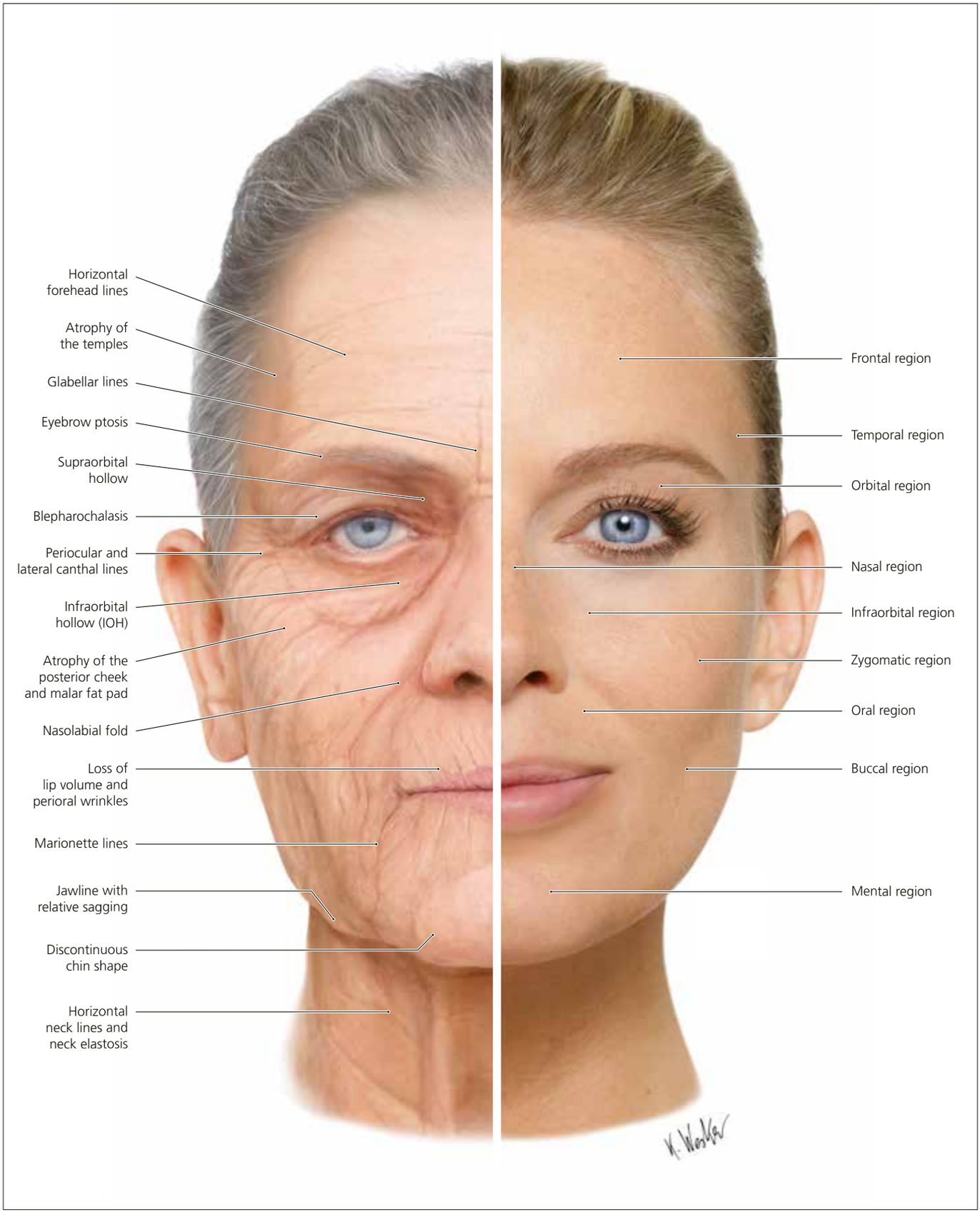


Fig. 2.2 Overview of regional age characteristics in the aged vs. young face.

The contraction of the facial expression musculature in the context of natural emotional expressions provokes dynamic wrinkling in the facial expression areas. Due to age, the facial expression muscles tend to hypertonise, which means that wrinkles that can actually be produced voluntarily remain permanently visible and thus become disturbing. In addition, there is a slowly shifting balance of strength between the depressor and elevator muscles, which is also involved in the age-related changes in the face.

2.2.4 Subcutaneous fat and connective tissue

The subcutaneous fat embedded in connective tissue is the volumising component in the soft tissue complex of the face. The fatty tissue provides a mechanical and physiologically supportive cushion for the skin and underlying structures. On one hand, it acts as a "shock absorber" to protect against injuries; on the other, it supplies the tissue complex with essential fluids and nutrients.

Two layers of fat can be distinguished on the face. The cohesive superficial fat layer is located above the SMAS. The deep fat bodies are discontinuously distributed underneath.

The superficial fat compartments form a cohesive system with a honeycomb-like appearance, consisting of small, highly septated fat lobules. The skin is anchored to the SMAS via this fish-skin-like base, providing it with a biomechanical support layer. If superficial fat is pronounced, the skin relief appears more homogeneous and the facial features appear delicate. This is the case in the adolescent face, particularly in the cheeks, the nasolabial fold, the glabella, the chin-jaw region and the front of the neck above the platysma. There is

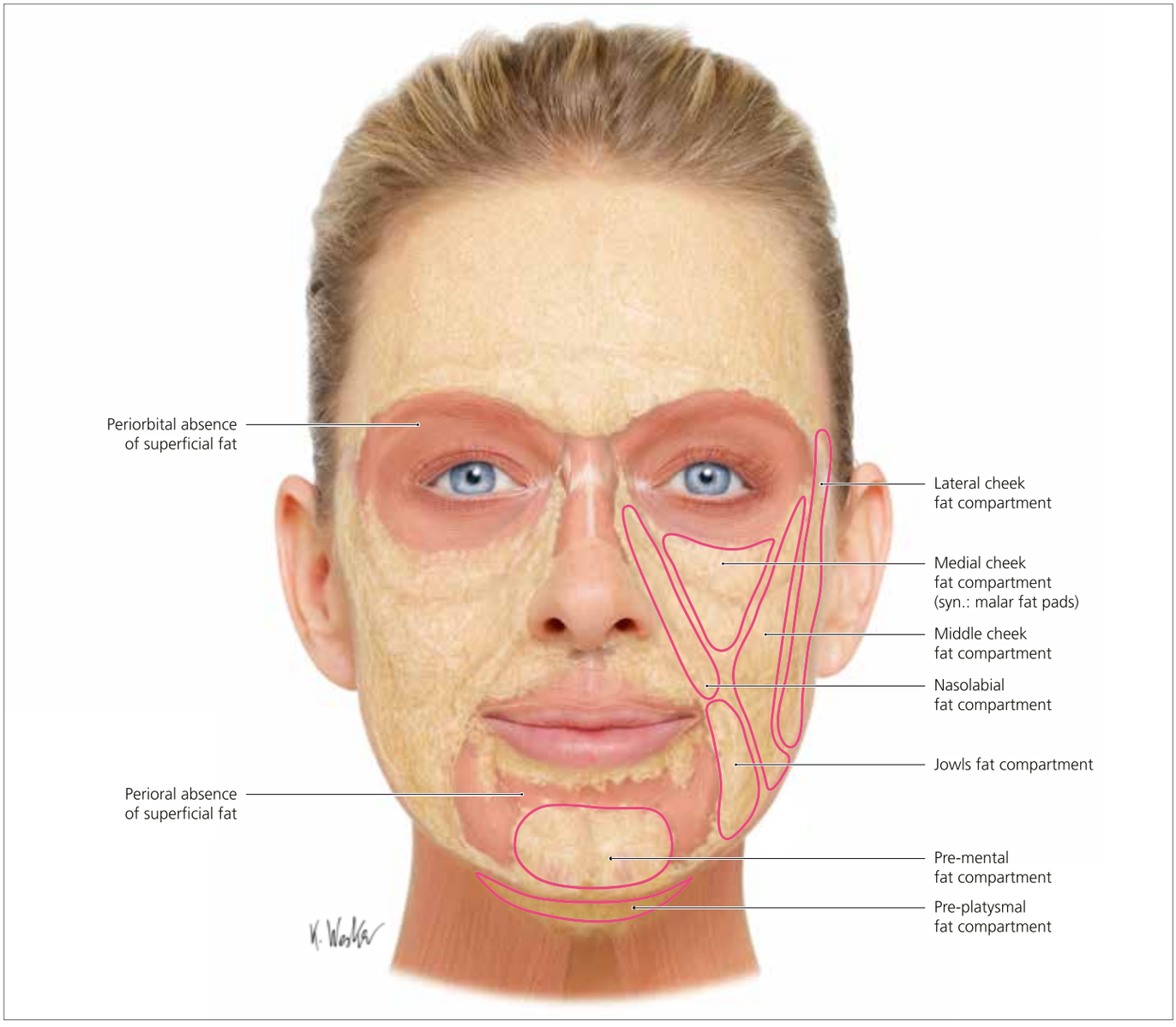


Fig. 2.13 Superficial fat deposits on the face.

little superficial fat in the area of the temples and forehead and almost none in the periorbital and perioral region.

The deep fat layer lies below the SMAS. In contrast to superficial fat, it has a discontinuous structure and is composed of individual separated fat bodies that are morphologically similar to lipomas. The fat lobes are larger and have little or no septation.

The deep fat serves as a cushion for the structures embedded in it, but also functions as an energy store and endocrine organ. It is the deep fat bodies that form the volumising basis for the other soft tissues in the youthful face and augment the overall complex. Their atrophy-related regression in the natural ageing process is regarded as the main initiator for the development of externally visible age structures. Furthermore, the trophic state of the deep fat layer is fundamental for the supply and fluid situation in the peripheral tissue layers.

Deep fat bodies are found on the face:

- Periorbicular, below the orbicularis oculi muscle (retroorbicularis oculi fat pad; retroorbicular occular fat pad [ROOF])
- Periorbicular, below the orbicularis oculi muscle (suborbicularis oculi fat pad; suborbicular occular fat pad [SOOF])
- In the area of the glabella (glabella fat body)
- In the area of the zygomatic muscles (deep cheek fat pad)
- Buccal (Bichat fat body)
- Temporal (temporal fat body) = temporal extension of the Bichat fat body
- Masseter (masseter process of the Bichat fat body)

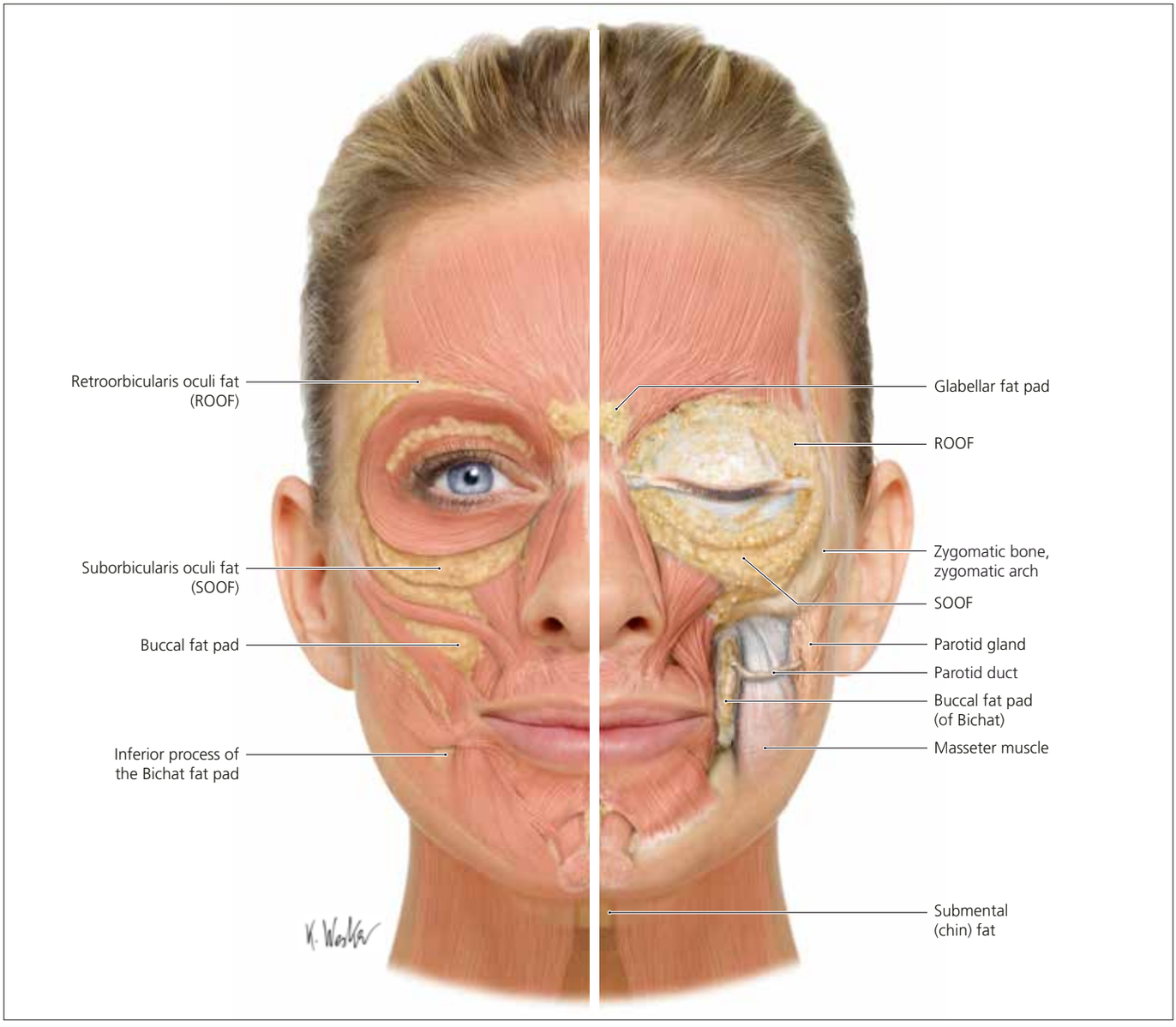


Fig. 2.14 Distribution of deep fat in the face.

3 Dermal fillers

3.1 Introduction

The preparations used in the past and present for augmentative corrections are numerous and can be grouped under the term "dermal fillers". Increasing knowledge of anatomical structures and a deeper understanding of skin ageing processes have led to the development of a wide range of filler materials. It is estimated that there are hundreds of products on the market in Europe alone that have a replenishing, tissue-saturating effect. This is also due to the fact that it is relatively easy to obtain authorisation for a filling preparation in Europe, whereas the regulations in the USA are stricter, only around 20 products having been approved there. The variety of products enables a very precise selection of the filling preparation according to requirements, but also means that the practitioner must have a great deal of knowledge and expertise regarding the properties of the products.

Products can be classified according to the following criteria, for example:

I Degradability

1. Resorbable (degradable)
2. Delayed absorption (slowly degradable)
3. Permanent (non-degradable)

II Body identical/alien

III Injection depth

1. Upper to middle dermis ("superficial")
2. Medium to deep dermis, subdermal ("medium-deep")
3. Subcutaneous ("deep")
4. Supraperiosteal ("maximum depth")

IV Material origin

1. Heterogeneous: animal or fermentative
2. Allogenic
3. Autogenous (patient's own)
4. Synthetic

High demands are placed on the various fillers. Ideally, the following properties are combined in one product:

- non-infectious;
- not pyrogenic;
- biocompatible;
- easy to inject;
- less pain-inducing;
- remaining at the injection site;
- longest-lasting filling effect possible;
- natural skin feel and natural appearance after treatment;
- good value.

However, the perfect filler has not yet been found and the advantages and disadvantages of the products must be carefully weighed up in each individual case. Degradable fillers, for example, have a lower complication rate and are therefore better tolerated. However, the treatments must be repeated every 4 to 12 months depending on the material. With long-lasting or permanent fillers, on the other hand, the effect lasts longer. However, complications are difficult or impossible to resolve, especially with permanent preparations.

In addition, there are constantly changing requirements and innovations. The materials used have changed considerably over the course of time. The use of dermal fillers began in 1893 with injections by Narber, when facial volume deficits were first filled with injections of autologous fat. From 1900 to 1935, paraffin wax was used, which was ultimately deemed unsuitable. The same was true of the liquid silicone first applied by Corning in 1962. A significant milestone was achieved in 1981 with the introduction of bovine collagen to the American market. Although its longevity was relatively low and collagen injections sometimes led to severe allergic reactions, it remained one of the most important filler materials for nearly two decades. The discovery of hyaluronic acid (HA) at the end of the 1990s revolutionised the market once again. Today, HA preparations are the agents of choice for tissue augmentation worldwide. Since then, a wide variety of products with different compositions have been developed, offering a broad range of applications, including mesotherapy, wrinkle augmentation, volumisation and even (body) contouring.

The regulatory classification of dermal fillers varies internationally, reflecting both differences in product composition and national legislation. In the authors' home market, Germany, fillers are classified as medical devices rather than medicinal products, meaning they are neither subject to prescription nor restricted to pharmacies. Any licensed physician—excluding dentists, who may inject only in the perioral area—may legally administer filler injections. However, appropriate application requires anatomical knowledge, technical skill, and clinical judgement, typically acquired through specialist training. Commercial incentives have nonetheless led to increased use by non-specialists. Under §1 of the Heilpraktikergesetz (HeilprG), alternative practitioners are also permitted to inject non-prescription fillers such as hyaluronic acid.

Within the European Union, dermal fillers are regulated under the Medical Device Regulation (EU) 2017/745 (MDR), which standardizes classification, safety, and performance requirements. Approval is decentralized through Notified Bodies, while national authorities oversee market surveillance. By contrast, the United States follows a centralized system: the Food and Drug Administration (FDA) classifies fillers as medical devices and mandates premarket evaluation for safety and efficacy.

3.2 Filling materials

The following is an overview of dermal fillers used in the past and present. Care has been taken to ensure completeness from a historical perspective, which is why materials that are only of minor relevance in clinical practice are also mentioned.

A distinction can be made between the following filling materials depending on the indication:

- Degradable filling materials
  - HA preparations
  - collagen preparations
  - autologous fat

- Long-lasting filling materials
  - poly-L-lactic acid microspheres (PLLA)
  - calcium hydroxyapatite microspheres (CaHA)
- Permanent filling materials
  - polyacrylamide
  - polymethylmethacrylate (PMMA)

Due to growing clinical experience in recent years, HA has emerged as the preferred biodegradable filler, completely replacing other materials such as collagen. As a result, augmentation procedures with hyaluronic acid fillers are the central focus of this illustrated atlas.

3.1.1 Degradable filling materials

HA preparations

HA (new nomenclature: hyaluronan) is a clear, viscous liquid and an essential component of skin, bone, cartilage and connective tissue. Chemically speaking, it is a glucosaminoglycan, composed of N-acetylglucosamine and glucuronic acid molecules, which is formed on the cell surface by HA synthases. The degradation is carried out enzymatically by hyaluronidases.

The most important property of HA is its enormously high water-binding capacity. As a result, the dermis also naturally retains its moisture, elasticity and resilience. Over time, however, the HA content decreases due to various physiological and ecological effects, including the natural ageing process, deficient perfusion and UV exposure. The skin and subcutaneous connective tissue lose moisture, resulting in volume atrophy and wrinkles. Since 1996, degradable HA preparations have been successfully used to correct these filling defects. The material is either of avian (cockscomb) or fermentative (bacterial culture) origin. In both cases, correct sterilisation is essential to avoid unwanted side effects. Aviane HA is sterile-filtered and then autoclaved. The molecules obtained by fermentation are also sterile-filtered, and some manufacturers also autoclave them and test them for endotoxins and viruses. A distinction is also made between native, non-cross-linked and cross-linked HA. While the native form stimulates the anabolic metabolism of fibroblasts, the cross-linked form is used for volume substitution due to its insolubility in water. The crosslinking agents used are 1,8-diepoxyoctanes (DEO), divinyl sulfone (DVS) or 1,4-butanediol diglycidyl ether (BDDE). DEO-crosslinked preparations are more resistant to enzymatic degradation, as a double cross-linking occurs via an ether and an ester bond.

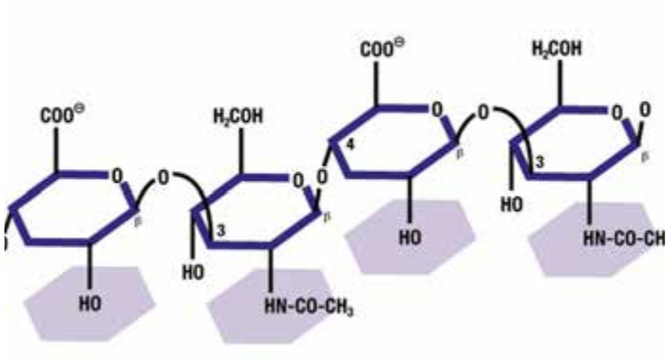


Fig. 3.1 Two disaccharide repeating units of HA.

The amount of cross-linked HA contained and the way in which it is cross-linked (technology used) determine the key properties of the filler during and after injection. For example:

- The water-binding capacity of the filler increases with the degree of cross-linking.
- The durability of the filling effect increases with the degree of cross-linking, as the degradation process takes longer.
- The elasticity and viscosity of the gel also depend on the cross-linking. In general:
- The viscosity (viscosity) of the material increases with the degree of cross-linking, but is also dependent on the cross-linking technology.
  - Highly viscous preparations are more difficult to inject, as a certain amount of force must be applied to pass through the thin needle tip. They have a particularly large projection effect due to the low horizontal spread, but are not easy to model after treatment. They are suitable for supraperiosteal applications.
  - Low-viscosity preparations are soft and easy to inject. Due to the good horizontal spread of the material, they create flowing transitions, but their projection effect is low. They are suitable for superficial applications.
  - Medium-viscosity preparations have a certain projection effect, but can still be modelled well and are relatively easy to inject. They are suitable for medium and deep applications.

Manufacturers of HA preparations have developed various cross-linking technologies to give their products specific clinical properties. In biphasic fillers, the gel formed after cross-linking is broken down into small particles and mixed with water or non-cross-linked HA to allow injection with fine-gauge needles. The following applies to these:

1. the smaller the particles, the easier the material is to break down and the shorter the filling effect.
2. preparations with small particles and low viscosity spread more horizontally and are particularly suitable for superficial injections.
3. preparations with larger particles have a higher viscosity and are particularly suitable for deeper injections.

Examples of innovative cross-linking technologies that result in biphasic gels are Q-Med Galderma's Optimal Balance Technology and Allergan's Vycross Technology, which can be used to produce particularly long-lasting fillers. However, based on clinical experience to the contrary, the authors cannot agree with the manufacturer's claim that the low water-binding capacity of these fillers can prevent swelling. On the other hand, Merz's CPM (cohesive polydense matrix technology) and Teoxane's RHA (Resilient Hyaluronic Acid) technology are used to produce monophasic fillers without particles, which spread independently in the tissue spaces after injection and create a smooth transition between the treated tissue region and the neighbouring areas.

There is a possibility of side effects due to the different toxicity of the cross-linking agents. The product properties also have an influence on the development of pain during injection. Some preparations contain painkillers such as lidocaine to prevent pain when injecting.

HA fillers are currently the most universally applicable filling materials with an enormously wide range of indications. The spectrum of side effects is low and the treatment results are good and reproducible.

2	Filler for medium-depth augmentations							
	Product name	**Provider**	**Indications**	**Application depth**	**HA content and cross-linking**	**Needle size**	**Special material properties**	**Website**
	BELOTERO Lips ontour	Merz Aesthetics	Lip contour, perioral wrinkles, corners of the mouth	Upper to middle dermis	22.5 mg/ml multi quercross-linked HA	30 G 1/2, 27 G 1/2	High cohesiveness, low viscosity, good tissue integration, with lidocaine (0.3%)	www.belotero.com
	BELOTERO Lips Shape	Merz Aesthetics	Lip volume, perioral wrinkles, corners of the mouth	Lip subcutaneous or supramuscosal; other indications: deep dermis	22.5 mg/ml multi quercross-linked HA	27 G 1/2	High cohesiveness, high elasticity, with lidocaine (0.3%)	www.belotero.com
	Juvéderm ULTRA 3	Allergan	Medium-deep and deep skin folds, lip contour, lip volume	Medium and deep dermis	24 mg/ml cross-linked HA (HYLACROSS-Technology)	27 G 1/2	Smooth gel, short shelf life, with lidocaine (0.3%)	www.juvederm.com
	Juvéderm ULTRA 4	Allergan	Deep skin wrinkles, volume build-up of lips and cheeks	Deep dermis	24 mg/ml cross-linked HA (HYLACROSS-Technology)	27 G 1/2	Smooth gel, short shelf life, with lidocaine (0.3%)	www.juvederm.com
	Juvéderm ULTRA SMILE	Allergan	Medium and deep wrinkles, lip augmentation, lip contouring	Mid-depth and deep dermis	24 mg/ml cross-linked HA (HYLACROSS-Technology)	30 G 1/2	Smooth gel, short shelf life, with lidocaine (0.3%)	www.juvederm.com
	Juvéderm VOLBELLA	Allergan	Superficial and medium-deep skin folds, lip contour and lip volume	Upper and middle dermis	15 mg/ml cross-linked HA (VYCROSS-Technology)	30 G 1/2	Good durability, good distribution (reason: lowest cohesiveness), tissue-provocative, with lidocaine	www.juvederm.com
	Juvéderm VOLIFT	Allergan	Deep skin wrinkles, contour deficits, volume build-up of lips, cheeks and chin	Deep dermis	17.5 mg/ml cross-linked HA (VYCROSS-Technology)	30 G 1/2	Good durability, good distribution, tissue-provocative, available with lidocaine	www.juvederm.com
	Restylane Refyne	Galderma (Zug, Switzerland)	Medium depth pleats	Middle dermis	20 mg/ml, gel moderate degree of cross-linking and low degree of calibration (balance technology)	30 G 1/2, 27 G Sterilglide (TSK)	Soft gel with moderate lifting capacity, available with lidocaine	www.galderma.com/mx/en/restylane

2	Filler for medium-depth augmentations							
	Product name	**Provider**	**Indications**	**Application depth**	**HA content and cross-linking**	**Needle size**	**Special material properties**	**Website**
	Restylane Defyne	Galderma	Deep creases	Deep dermis, subdermal	20 mg/ml, gel with very high degree of cross-linking and high degree of calibration (Balance-Technology)	27 G 1/2, 27 G Steriglide (TSK)	Moderately firm gel with high lifting capacity, available with lidocaine	www.galderma.com/mx/en/restylane
	Restylane Kysse	Galderma	Lip volume, lip contour	Lip red, submucosa	20 mg/ml, gel with high degree of cross-linking and low degree of calibration (balance technology)	30 G 1/2, 25 G and 27 G cannula Steriglide (TSK)	Moderately soft gel with moderate lifting capacity, available with lidocaine	www.galderma.com/mx/en/restylane
	Restylane	Galderma	Correction of moderate facial wrinkles	Middle dermis	20 mg/ml stabilised HA (NASHA technology)	29 G 1/2 needle, 27 G cannula Pixl	Solid gel with moderate lifting capacity, available with lidocaine	www.galderma.com/mx/en/restylane
	Restylane Lyft	Galderma	Deep wrinkles, light to moderate facial contouring	Deep dermis, subdermal	20 mg/ml stabilised HA (NASHA technology)	29 G 1/2, 23 G and 25 G cannula Pixl	Solid gel with high lifting capacity, available with lidocaine	www.galderma.com/mx/en/restylane
	Sculptra	Galderma	Medium to deep wrinkles, volume build-up, contour optimisation, collagen stimulation	Deep dermis, subcutis	Filler based on PLLA (150 mg PLLA, 90 mg sodium carboxymethylcellulose, 127.5 mg pyrogen-free mannitol)	27 G 1/2	Long-lasting filler, collagen stimulation	www.galderma.com/sculptra
	TEOSYAL-Global Action	Teoxane	Medium-depth folds, also universal for all indications except tear troughs	Middle dermis	25 mg/g Cross-linked HA (RHA technology)	30 G 1/2	Moderately viscous gel, also available with lidocaine	www.teoxane.com/en
	TEOSYAL-RHA 3	Teoxane	Deep dynamic wrinkles, lip augmentation	Deep dermis	23 mg/ml (Preserved Network Technology)	27 G 1/2	Solid gel, long shelf life: 12–18 months, with lidocaine (0.3%)	www.teoxane.com/en

6 Treatment

Now that all the steps preceding treatment have been outlined in the previous chapters, this chapter describes the necessary treatment steps and parameters. The authors also provide a synopsis of the most common injection techniques and their modifications.

6.1 Treatment environment/setting

The treatment environment and atmosphere should convey the highest possible level of professional care. A bright, well-ventilated and pleasantly tempered treatment room contributes to this. Ideally, the treatment area will be easily accessible from all sides for the therapist and their assistant.

The treatment itself should be carried out without time pressure. Even if prior discussions were thorough, patients will still have questions, concerns or additional requests immediately before treatment. The practitioner should respond to these openly, patiently and without haste. Optimal treatment outcomes can only be expected with full compliance. From this point of view, it is advisable to go through the planned treatment again in detail. The actual treatment only takes place once all open questions have been clarified and any uncertainties have been resolved.

Psychological support for tense patients is also important so that treatment can be carried out quickly and comfortably. Tactile stimuli ("stress balls"), music and a generally pleasant atmosphere are helpful.

6.2 Positioning and lighting

Treatment is usually carried out in a special treatment chair that can be adjusted in both height and inclination. The backrest should be infinitely adjustable down to a reclining position. It is important to note that the proportions of the face change in comparison to an upright posture when lying down. The more upright the position, the more reliable the treatment planning; it is therefore carried out in an upright position. Treatment in a semi-recumbent position allows the patient to relax better.

To make the skin relief and wrinkles more visible, illumination should be from the side. With full frontal illumination of the treatment area, wrinkles are less visible. The working height is adapted to the height of the practitioner in order to ensure a back-friendly and ergonomic working method with an upright posture.

6.3 Ergonomics

Ergonomics in this context relates to the therapist's back-friendly posture. An ergonomic, back-friendly posture enables them to treat patients in a relaxed manner and prevent back problems in a targeted manner. The basic principles of ergonomic working posture include working with a straight upper body and avoiding rotational movements between the pelvis and shoulder girdle. Turns and changes of position involve the whole body.

Treatment positions

Fig. 6.1 Upright position: As the proportions change with the position, treatment planning is carried out in an upright position.

Fig. 6.2 Semi-recumbent position: The semi-recumbent position makes it easier for the patient to relax and allows the practitioner to work more ergonomically, as all areas of the face are easily accessible in this position.

Posture during treatment

Fig. 6.3 Optimal posture: In this position, the therapist's pelvis and shoulders are not rotated towards each other, the back is straight and upright and the injection arm is supported on the treatment table.

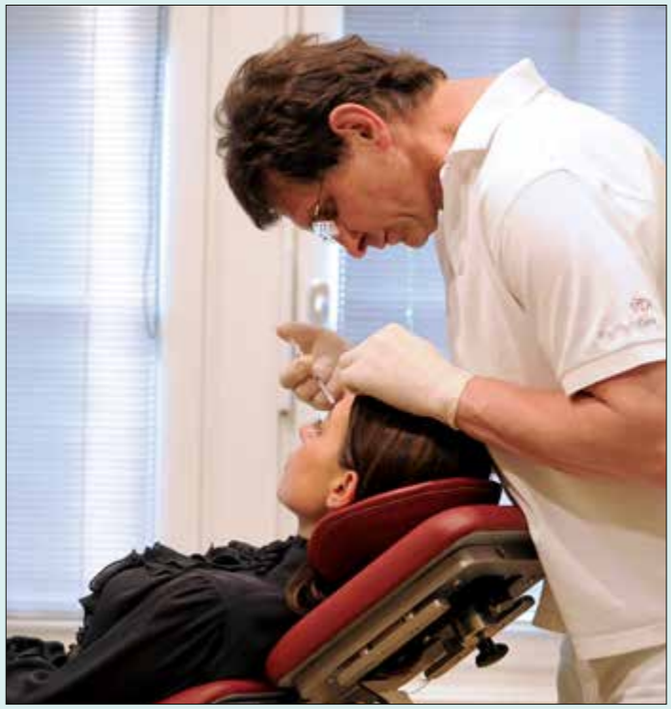


Fig. 6.4 Incorrect posture: Here, the treatment height is clearly too low: the therapist has to arch their back, which leads to increased strain in the cervical spine area. A relaxed, ergonomic way of working is not possible in this position.

Treatment aids

Fig. 6.5 Topical local anaesthetics: Local anaesthetics based on lidocaine & prilocaine or tetracaine can be used for anaesthesia in sensitive patients. (EMLA 25 mg/g + 25 mg/g cream, Aspen, Munich, Germany).

Fig. 6.6 Magnifying glasses: Glasses such as those shown here provide about four times the magnification and are an ergonomic aid for the therapist when carrying out injections.

Fan technique

The fan technique is a serial, fan-shaped tunnelling technique starting from an injection point.

The fan technique is suitable for the sides of the face and cheeks to augment larger areas quickly and evenly.

Tips and tricks:
When retracting, be sure to reduce the plunger pressure shortly before reaching the puncture point to prevent excessive material accumulation.

Fan technique

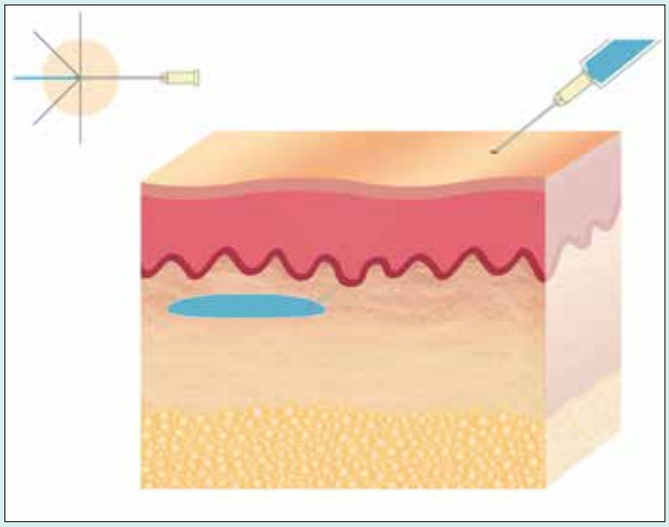


Fig. 6.41 The puncture is made at an angle of about 45 degrees.

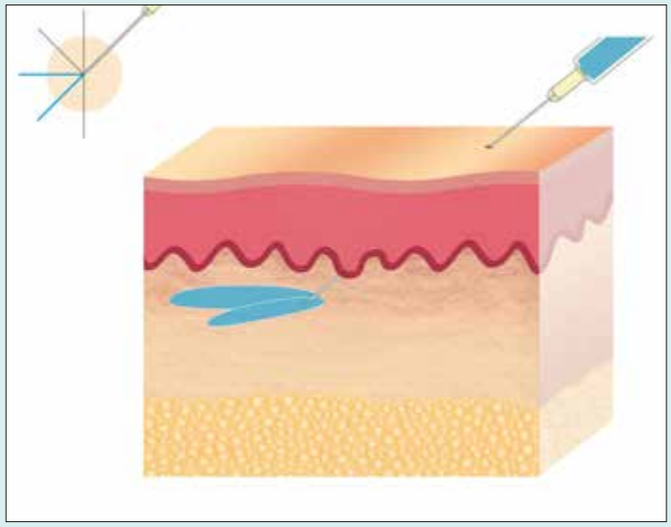


Fig. 6.42 Injection during retraction.

Fig. 6.43 Do not pull the needle completely out of the skin, ...

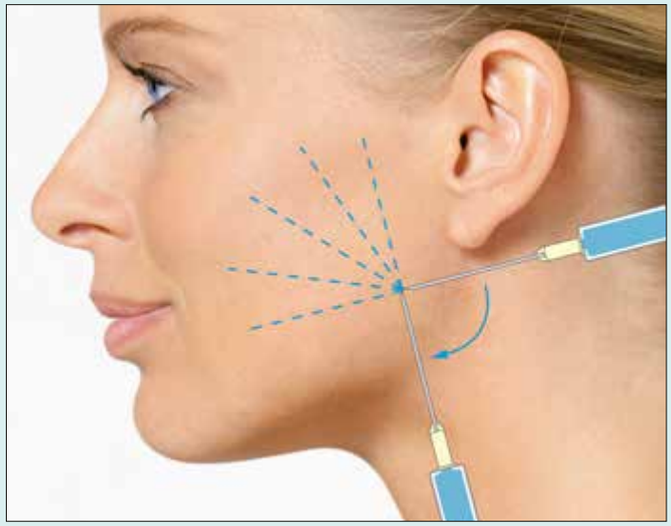


Fig. 6.44 ... but push it forward again at a different angle.

Criss-cross technique

The criss-cross technique is a serial tunnelling technique arranged in a grid pattern. It can be used for the superficial elastosis treatment of aged skin (biorevitalisation). It is also used for the superficial correction of extended defects with the aim of creating a flat and supporting network in the dermis. This technique can be used for aesthetic treatments in general, but also for the treatment of burns or weak connective tissue in particular. The preparations should always be injected in the same plane to avoid unevenness.

Tips and tricks:

The criss-cross technique can be used to reach all layers of the skin:

- Biorevitalisation: superficial, use of non-cross-linked hyaluronic acid preparations
- Wrinkles: support of the middle dermis with low-grade cross-linked hyaluronic acid preparations
- Substance defects: subdermal concealment (not correction) of the deficit with moderately cross-linked hyaluronic acid preparations.

Criss-cross technique

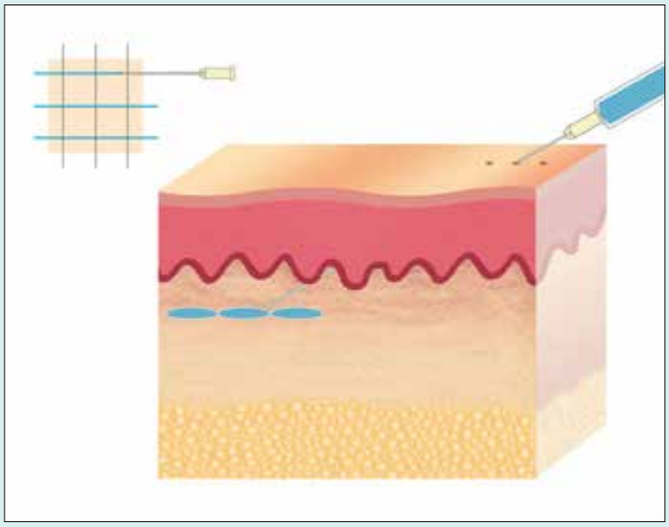


Fig. 6.45 Initially, linear injections are made from adjacent injection points. The injection is carried out with light, even piston pressure during withdrawal.

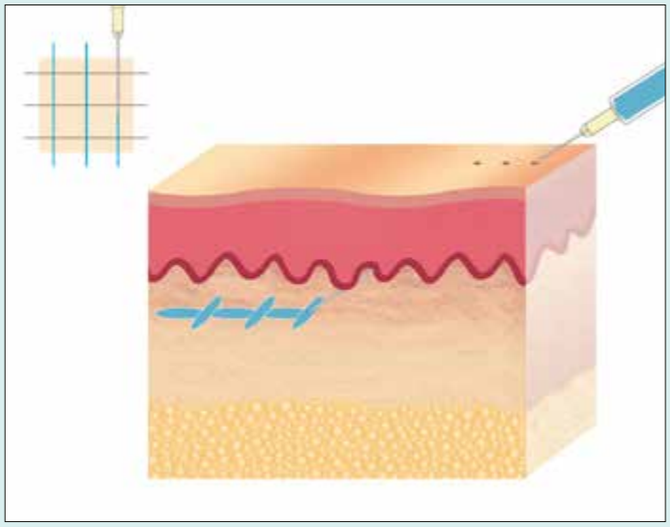


Fig. 6.46 A second series of linear injections is performed at a 90-degree offset.

Fig. 6.47 A new puncture is made for each line.

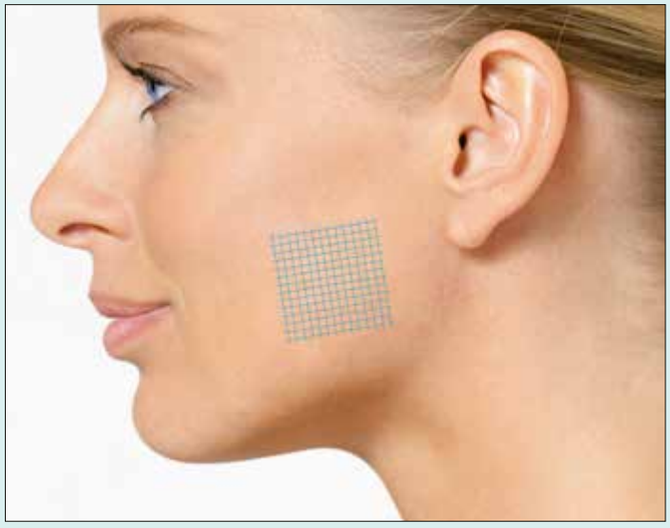
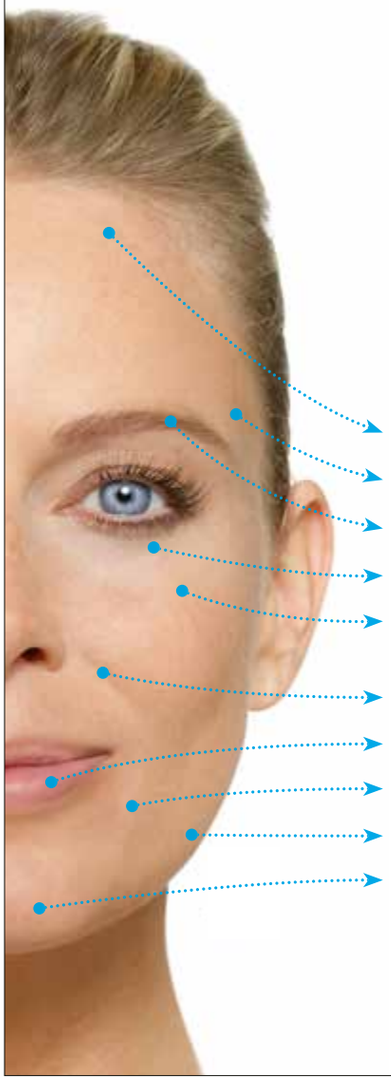


Fig. 6.48 The injections follow a chequered pattern.

III DHAC

Indications



Regional structures:

- Forehead volumisation
- Temple volumisation
- Eyebrow ptosis
- Infraorbital void
- Overall harmonisation of the midface
- Nasolabial fold
- Lips
- Marionette lines
- Chin-jaw line
- Chin volumisation

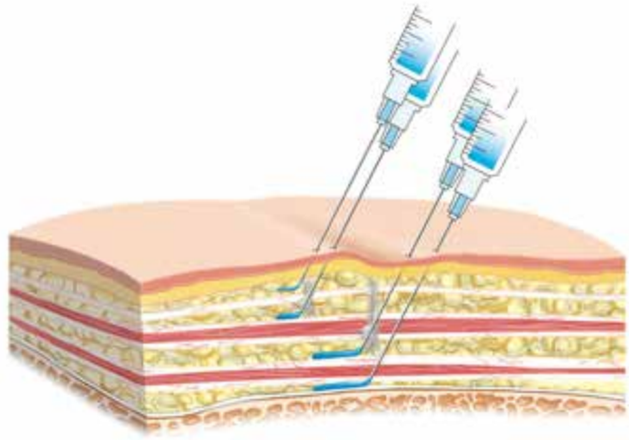
Practical procedure

Injection depths: subcutaneous, supramucosal, supraperiosteal, submuscular (= in deep fat bodies)

Application techniques: DHAC

Products: 3 (p. 68), 4 (p. 70), B (p. 73)

Needles: 22–25 gauge



III DHAC

Treatment goals

- To perform comprehensive tissue homogenisation and augmentation
- To perform harmonic projection of strongly muscularly influenced areas
- To enable anatomical release of structures adhering to the atrophied base and reduction of tensile forces on the skin
- To perform fibrogenetic activation with neocollagen and neoelastin synthesis

Predictable postoperative course

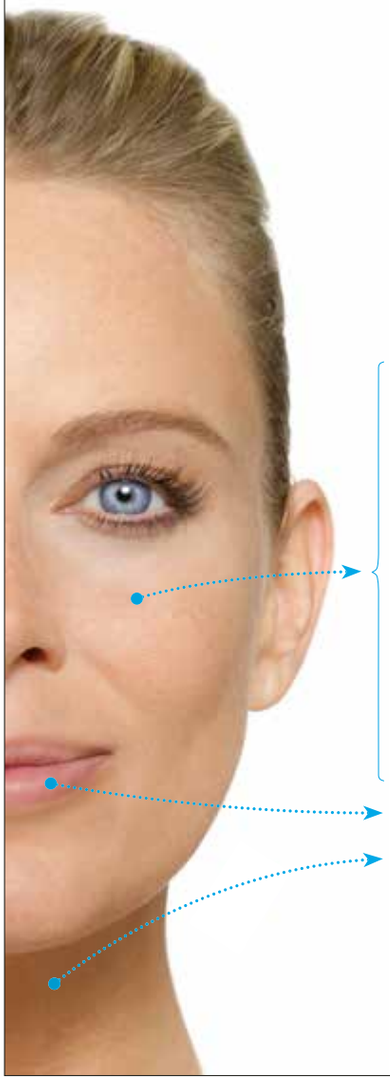
Primary clinical improvement: Depending on the target structure treated and the depth of the treatment, a clinical improvement can be seen immediately after tissue mobilisation. Accordingly, a decision can be made as to whether a vertical projection effect is required in addition to the mobilising measure (e.g. in the treatment of a deep nasolabial fold and marionette lines). The greatest possible degree of harmonisation can be expected after 2 to 3 weeks.

Secondary therapeutic effects: Extensive secondary tissue regeneration through physiological mechanisms can be expected as a result of the extensive improvement in fluid conditions and the fibrogenetic activities induced with the blunt cannula. After 2 to 5 months, material integration can be considered largely complete.

Temporary side effects: The usual temporary side effects after filler injections (see section 3.4, p. 58) such as limited swelling for 2 to 5 days are possible. If a wide blunt cannula (22 gauge) is used at deeper levels in the area of larger blood vessels, major side effects, e.g. due to intravascular injections, are extremely unlikely.

IV SSRA

Indications



Regional structures:

- Superficial overall facial harmonisation
- Various skin defects
- Skin dryness
- Poorly perfused skin
- Light-damaged skin
- Age-related "wrinkled skin"
- Stressed skin
- Lips
- Neck and décolleté
- Hands

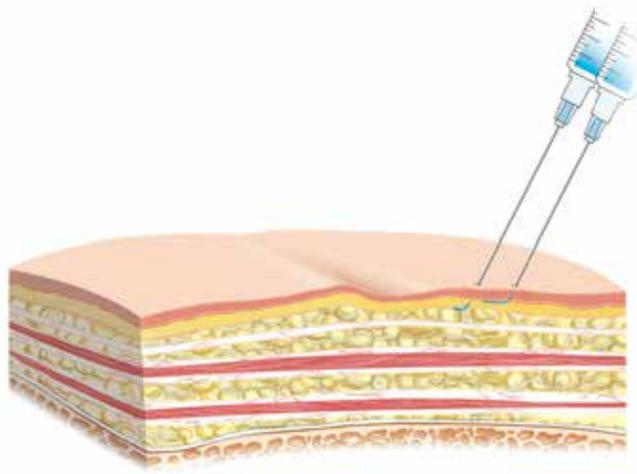
Practical procedure

Injection depths: Intradermal, subdermal

Application techniques: SHMA, serial point technique, criss-cross technique

Products: 1 (p. 64), A (p. 72), B (p. 73)

Needles: 30–32 gauge needle, 27 gauge microcannula (SHMA)



IV SSRA

Treatment goals

- To homogenise the skin surface and remove skin defects
- To harmonise the physiological and clinical properties of the skin (moisture content, suppleness, complexion)
- To perform saturation of the subdermal support of the skin
- To improve skin's nutrient supply and regulation of the epidermal barrier function

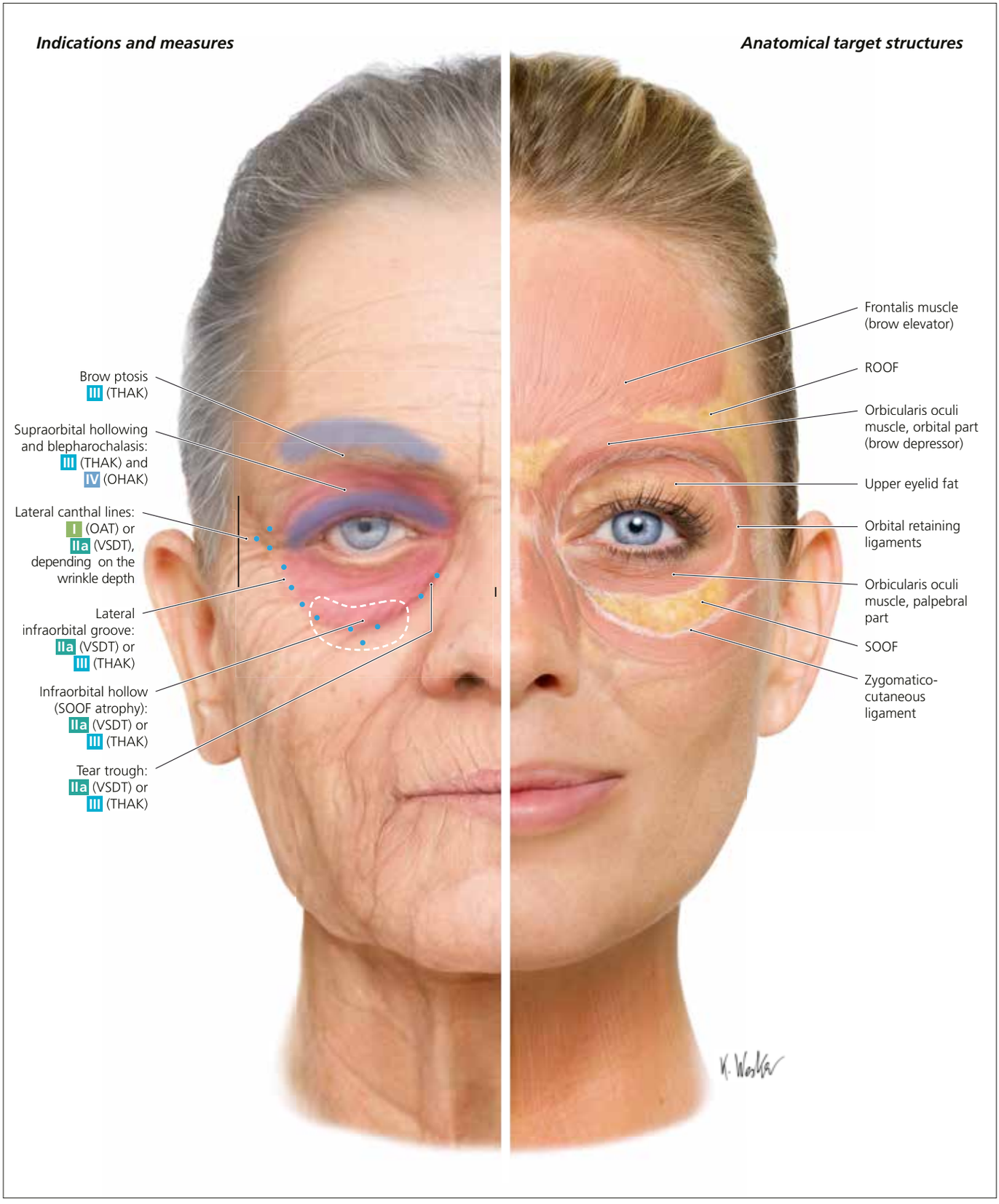
Predictable postoperative course

Primary clinical improvement: A slight superficial homogenisation may be immediately visible. It takes 2 to 3 weeks until the skin regeneration mechanisms have been initiated and the results are visible on the outside.

Secondary therapeutic effects: The measure induces fluid-induced tissue regeneration and, depending on the injection technique and depth, possibly also fibroblastic neocollagen and neoelastin synthesis. Following the primary effect, the secondary effects of hyaulronic acid injections can accordingly be expected to further improve the condition of the skin and prevent skin ageing.

Temporary side effects: The usual temporary side effects after filler injections (see section 3.4, p. 58) such as limited swelling for 2 to 5 days, are possible. In terms of fibroblastic activation, small skin puncture haematomas may even be desirable.

7.3 Periorbital region



Comprehensive overview of the target structures and practical measures of a cause-related augmentation therapy of the periorbital region. ● VSDT (or alternatively SAT for camouflage); DHAC; SHMA and DHAC

7.3.1 Supraorbital region (eyebrows and upper eyelids)

The eyebrows are striking reference shapes on the face. Brow colour, position, arch, density and shape contribute significantly to the overall look of the face. Deep, sagging brows convey a tired, relaxed expression. High, arched brows make the face look fresher, more alert and youthful.

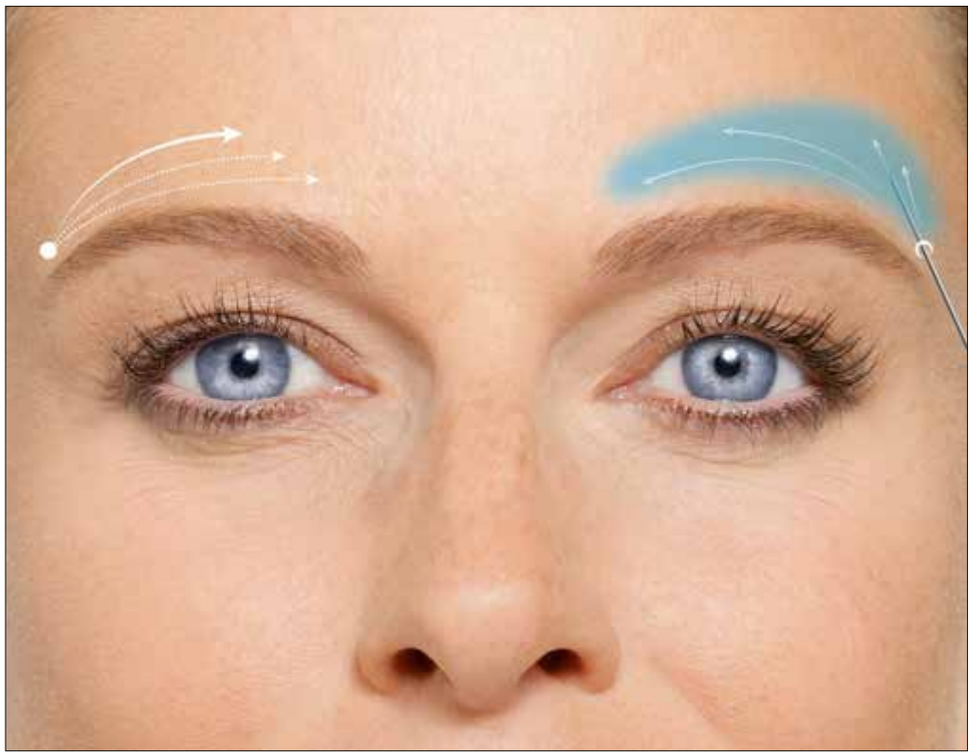
The brow and upper eyelid region can be seen as a coherent complex that is stabilised by a common suspension apparatus. In the course of atrophy-induced brow ptosis, the fine, slightly fat-padded upper eyelid skin also sags, which can lead to wrinkling and possibly also blepharochalasis. Hollow eyes (supraorbital emptiness) can also be observed in old age due to congenital factors. The eye area of the affected person appears tired and haggard and takes on skull-like features.

As a guide for describing an ideal eyebrow shape, the brow is divided into three thirds. However, the prerequisite for this is an ideal position of the eyes, which is not present in the case shown. The distance between the eyes is one eye width. The first two thirds rise gently from medial to lateral and then fall slightly. The reference points can be displayed using three auxiliary lines, and are as follows:

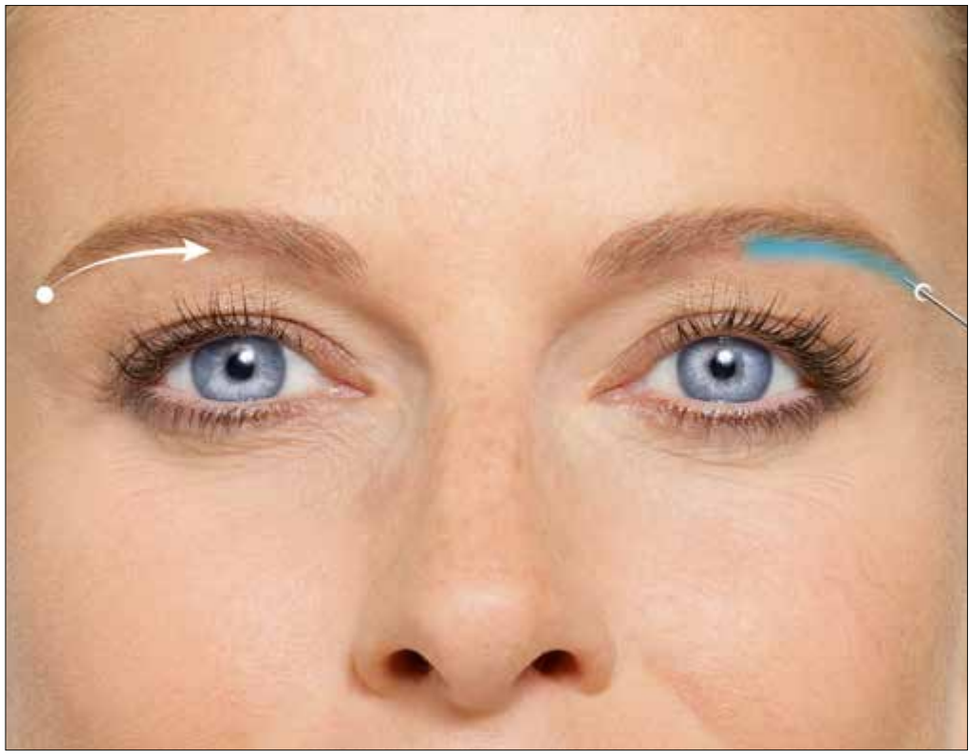
- **Start of eyebrow** Vertical line directly next to the wing of the nose
- **Point of curvature or vertex connecting** line nostril – pupil – brow
- **Brow end** Connection point nose wing – lateral corner of the eye – brow end (beyond this point, brow hairs may disturb the harmonious image)

Treatment planning – augmentation of the brow

The aim of the treatment is to augment the brow through volume compensation in the ROOF. By volumising the fat chamber, the suspension apparatus of the brow and upper eyelid is tightened and the supraorbital complex is lifted. Augmentation is performed using a horizontal mobilising injection with a blunt cannula. In addition, a further injection can be used to emphasise the lateral part of the eyebrow to accentuate the brow arch.



Technique DHAC
Insertion site At the lateral end of the brow, at the level of the crista temporalis
Injection depth and direction Into ROOF from lateral to medial
Volume 0.2–0.3 ml
Needle 22–25 gauge cannula



Technique Tunnelling technique
Injection site At the lateral end of the brow
Injection depth Subdermal
Volume Depending on findings 0.2–0.5 ml
Needle 30 gauge; alternatively cannula (25–27 gauge)

Treatment – augmentation of the brow

DHAC

At the lateral end of the eyebrow, at the level of the temporal bone, the skin surface is grasped and opened using a Nokor needle.

The cannula is then advanced into the fat pad and the tissue is gently mobilised. A quantity of filling material (0.2–0.3 ml per brow) is injected as required.

Treatment procedure
- Make-up removal
- Disinfection
- Anaesthesia (only for very sensitive patients)
- Injection: DHAC, if necessary with superficial correction
- Massage/modelling of the filler
- Cooling after treatment
- Patient information for behaviour after treatment
- Scheduling of a check-up appointment

Selection of preparations
Due to the shallow depth of the injection and the anatomical delicacy of the structures:
1 Filler for superficial augmentation (p. 64)
2 Filler for medium-depth augmentations (p. 65)

In the region prone to swelling, preparations with a lower water-binding capacity are preferable.

Possible combinations
- Drug denervation of the orbicularis oculi muscle 1 to 2 weeks before augmentation
- Neocollagenesis to lift the brows using micro-focused ultrasound in the forehead region

Complications/dealing with complications
- Palpable nodules may form due to aggregation of the substance used. A modulating massage of the injected material directly after the injection leads to an even distribution.
- Inflammation may occur in the area of the inserted substance.

Practical tips
- In cases of asymmetry, treat only the lower-positioned brow.
- The treatment outcome can be improved by prior botulinum toxin A therapy (chemical brow lift).
- If an incidental brow ptosis occurs as a result of botulinum toxin A treatment of the orbital region, this can be (partially) antagonised by augmentation treatment.
- The region is predisposed to swelling after treatment. To minimise this, hyaluronic acid preparations with a rather low water-binding capacity (e.g. Restylane Vital Light) should be used.
- As the vessels run in depth, particularly in the medial part, this area should only be treated with a blunt cannula (22–25 gauge).

Treatment planning – upper eyelid

The aim of the treatment is to volumise the upper eyelid to treat supraorbital emptiness and skin wrinkling. A two-level procedure is recommended, which is best performed with a blunt cannula to prevent bleeding. First, a small amount is administered deep into the area of the upper fold to eliminate the hollow eye. The cannula is then used to superficially reline and tighten the skin surface of the entire upper eyelid between the upper fold and the bony orbital rim.

Technique DHAC
Insertion site Laterosuperior orbital rim
Injection depth and direction
Submuscular along the upper fold of the upper eyelid from lateral to medial into the deep fat (ROOF)
Volume 0.2–0.4 ml
Needle 22–25 gauge cannula

Technique SHMAC
Insertion site Same entry point on the lateral orbital rim
Injection depth and direction
Subdermal from lateral to medial in the entire upper eyelid area
Volume 0.05–0.2 ml
Needle 22–25 gauge cannula

Treatment – upper eyelid

DHAC

The stab incision is made at the lateral edge of the orbit at the level of the lateral end of the envelope fold using a Nokor needle (small illustration). The cannula is advanced medially and positioned in the deep fatty tissue (ROOF). The supraorbital substance deficiency is compensated for by injecting approximately 0.05–1 ml of filler under gentle tissue mobilisation.

SHMAC

The cannula is then used to mobilise the subdermal plane under the skin surface in the area of the entire upper eyelid and 0.05–0.2 ml of filling material is added.

Treatment procedure
- Make-up removal
- Disinfection
- Anaesthesia (only for very sensitive patients)
- Injection: DHAC, SHMAC
- Massage/modelling of the filler
- Cooling after treatment
- Patient information for behaviour after treatment
- Scheduling of a check-up appointment

Selection of preparations
Due to the shallow depth of the injection and the anatomical delicacy of the structures:
1 Filler for superficial augmentation (p. 64)
2 Filler for medium-depth augmentations (p. 65)

In the region prone to swelling, products with a lower water-binding capacity are particularly suitable.

Possible combinations
Drug denervation of the orbicularis oculi muscle 1 to 2 weeks before augmentation.

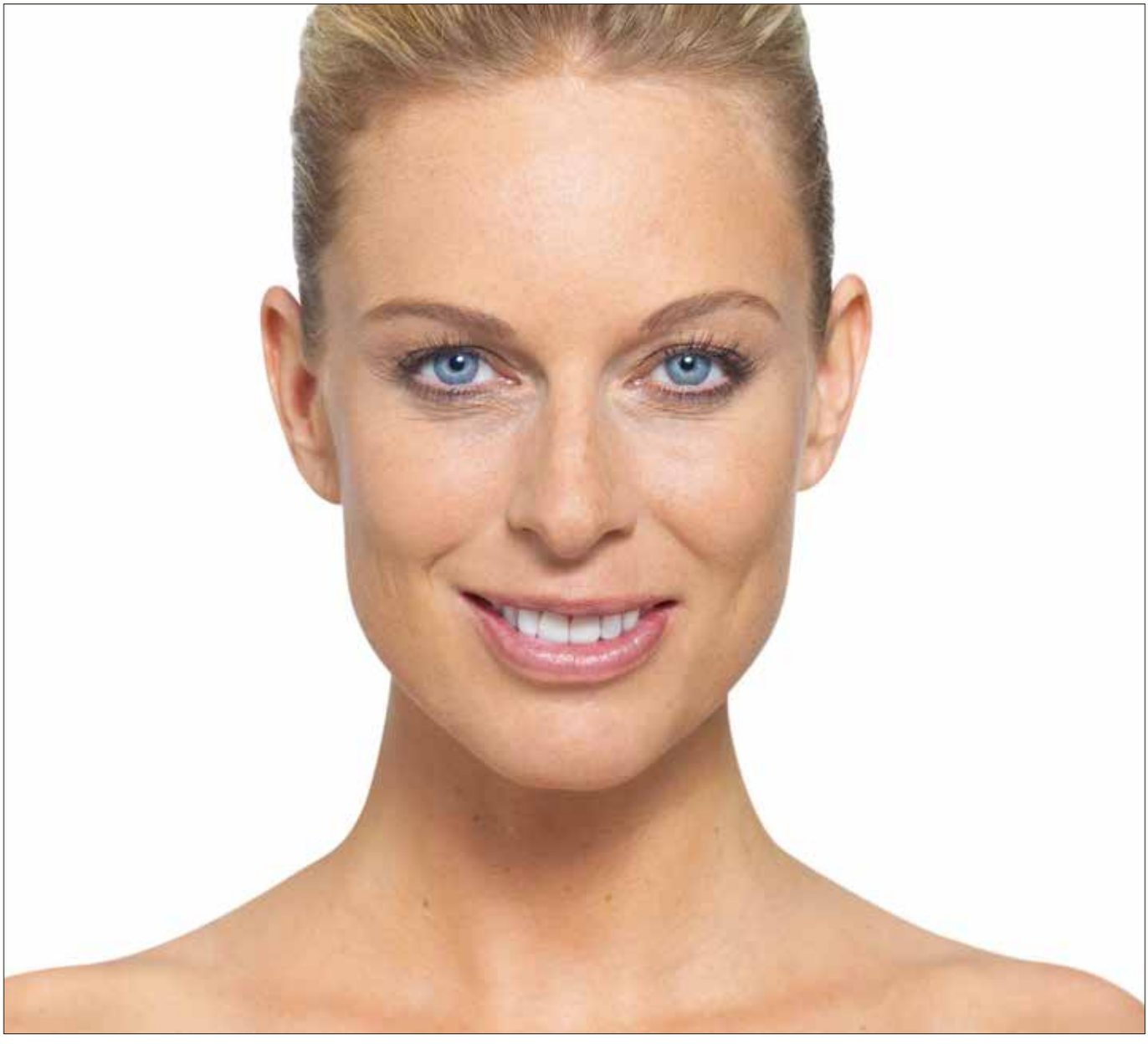
Complications/dealing with complications
- Injections under the fine skin of the upper eyelid may cause concern, but are generally harmless. The bulb is far enough away not to be injured. To minimise bleeding, a sufficiently blunt cannula (22–25 G) should be used despite the delicacy of the anatomical structures.
- Palpable nodules may form due to aggregation of the substance used. A modulating massage of the injected material directly after the injection leads to an even distribution.
- Inflammation may occur in the area of the inserted substance.

Practical tips
- Swelling is to be expected, which is why preparations with as little water-binding effect as possible should be used.
- By using the two-stage horizontal augmentation method, the tissue is filled depending on the material, revitalised depending on the fluid and regenerated fibrogenetically. In this way, a maximum improvement in atrophy- and skin ageing-related changes can be achieved.
- In order to avoid or counteract weighting of the upper eyelid and thus the appearance of sagging, only very small amounts of filler should be applied in the subdermal plane.

7.5.2 Lips

The lips have a high nerve density, which makes them extremely delicate and sensitive to pain. As a visible demarcation of the mouth, they play a key role in the production of mimic expressions.

It is often possible to gauge a person's mood just by looking at the corners of their mouth. For example, the downturned corners of the mouth convey seriousness, sadness or contempt. As a symbol of sensuality, lips can have a significant influence on a person's attractiveness. Full, symmetrical lips with a healthy colouring embody the ideal state. The fullness of the lips is defined by the height of the vertical diameter. In a youthful mouth, the lower lip is more voluminous.



Patient selection
Due to the many possibilities of lip modulation using augmentation procedures, careful consultation is paramount. The patient's wishes should always be put into perspective with the expected results. Isolated increases in lip volume must be weighed against the effects on the overall harmony of the face.

Evaluation of the indication
Correcting the lips falls within the domain of augmentation procedures. Lip fullness and spreading, contouring of the lip edges, emphasising the cupid's bow, lifting the corners of the mouth, fine, radial wrinkles and the surface texture of the lip can be influenced.

Anatomy

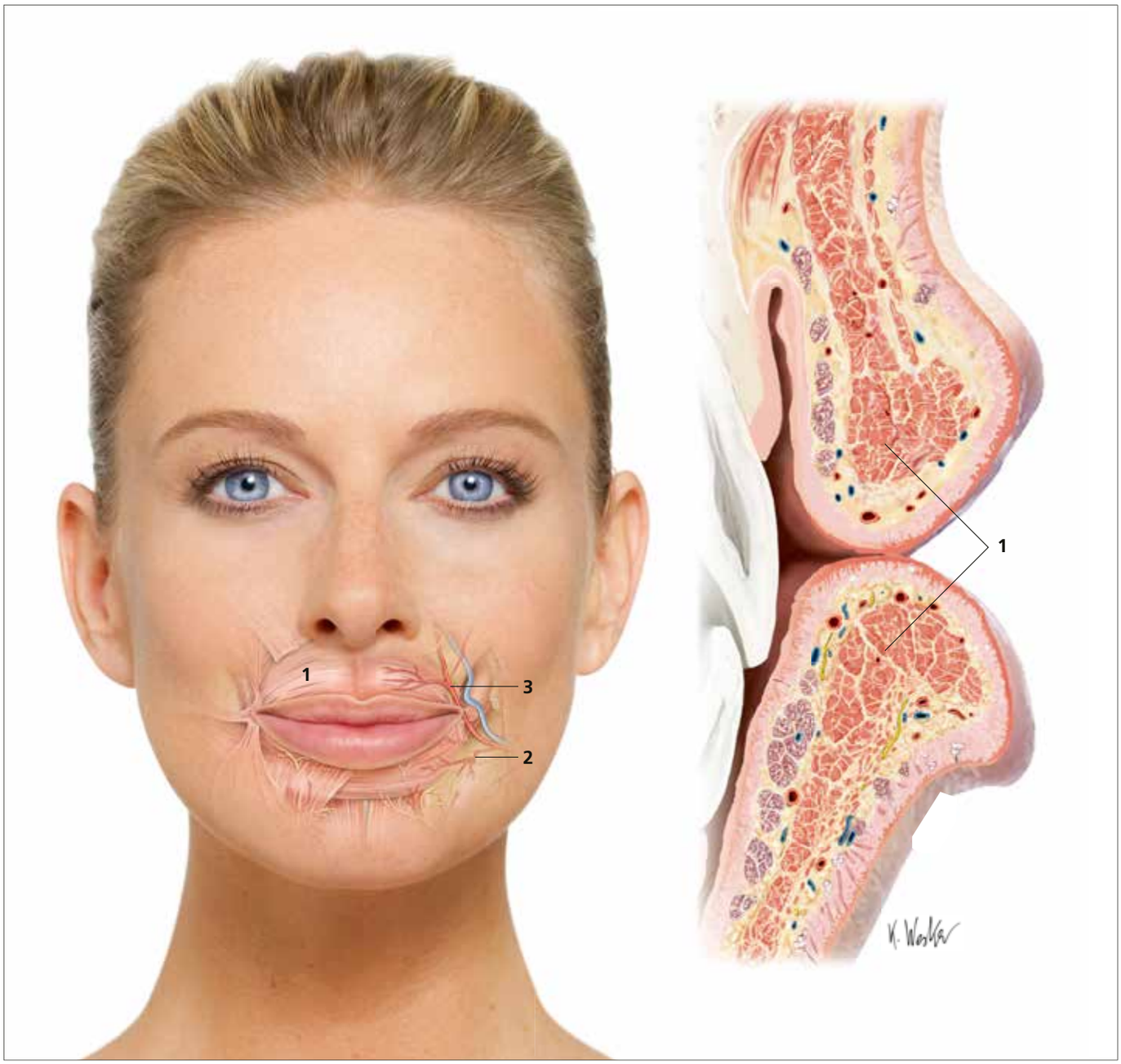
The orbicularis oris muscle (1) forms the basis of the musculoskeletal system of the lips. The part of the muscle ring further away from the mouth opening can reduce mouth opening and protrude the red of the lips, as in whistling.

If only the part that lies in the lip red at the lip edge contracts, the lip red is tilted inwards towards the anterior teeth, thus reducing the visible part. All facial muscles that pull the lips or corners of the mouth laterally, upwards or downwards and thus widen the cleft of the mouth have an antagonistic effect.

With three to five cell layers, the skin of the lip is very thin compared to the cell layers of the rest of the facial skin. In people with a light skin colour, there are no melanocytes in the skin of the lips. The lips get their intense red colour from the blood flow in the superficial blood vessels. This colouring is less pronounced in people with a darker skin colour, as their lips are pigmented.

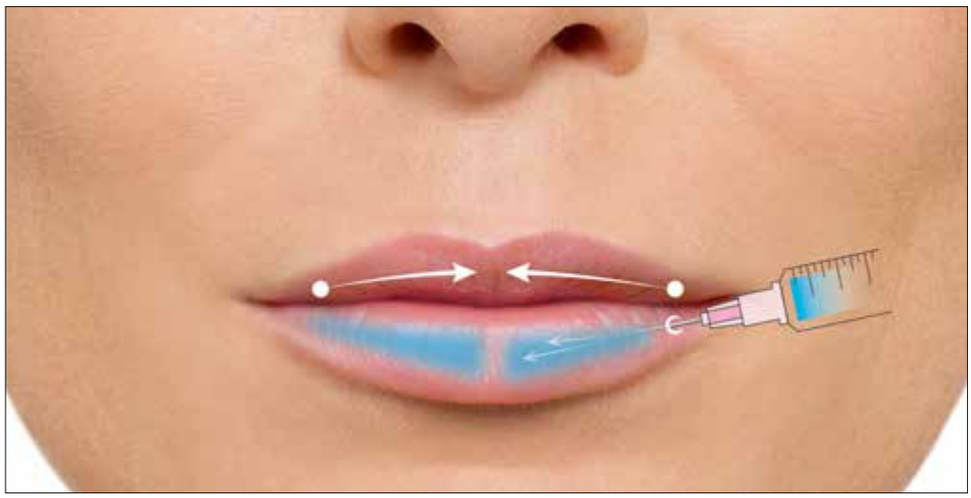
Blood is supplied to the lower lip through the inferior labial artery (2) and to the upper lip through the superior labial artery (3). The vessels are usually located submucosally. However, the course can be very variable and the vessels can also be located intramuscularly or subcutaneously.

As the skin on the lips has neither sweat nor sebaceous glands, it lacks the hydro-lipid film that is typical of body skin. This dries out the skin of the lips more quickly and makes it more easily brittle.

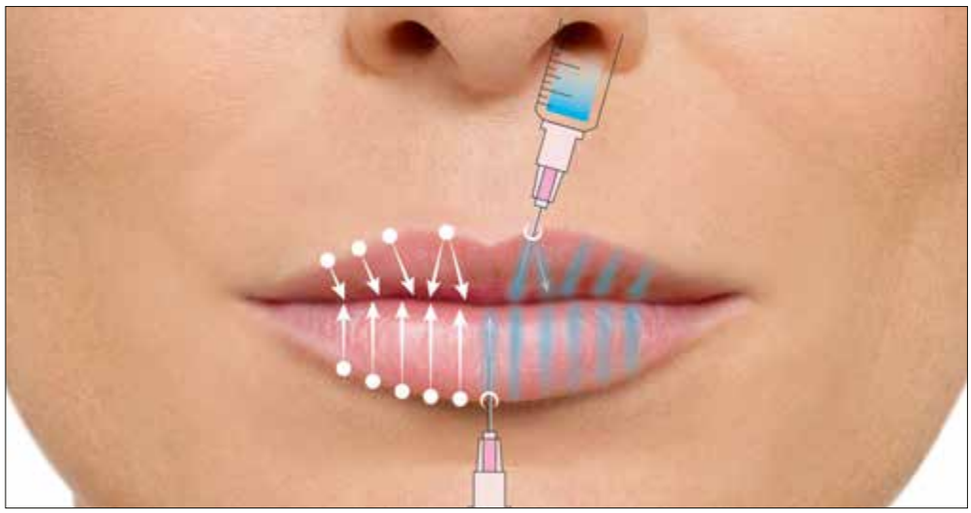


Treatment planning – lip volumisation

The aim of the treatment is to evenly and harmoniously volumise the lip. To achieve this, treatment should be started in the white lip area, the lip foundation and accordingly the natural spreading area of the lip, if there is a tissue deficit. Otherwise, it would be difficult to predict how material administered in the red lip area would present itself compared to the narrow base through the ring muscle. The ideal procedure accordingly consists of a combination treatment of the white and red lip areas. A procedure using a blunt cannula is particularly suitable for proportional volume augmentation in the red lip area.

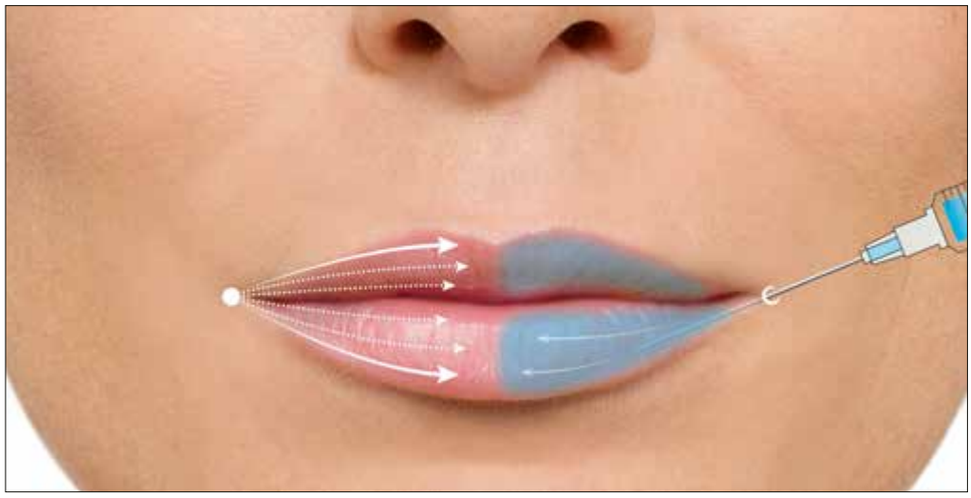


Technique Linear horizontal technique
Injection points One injection point per quadrant medial to the corner of the mouth
Injection depth and direction Parallel to the course of the lips through the orbicularis oris muscle towards the centre of the lips
Volume 0.1–0.25 ml/quadrant
Needle 27–30 gauge



Technique Linear vertical technique
Injection points Two to five injection points per quadrant at the lip red-lip white border
Injection depth and direction Vertical to the course of the lips through the orbicularis oris muscle in the direction of the rima oris
Volume 0.1–0.25 ml/line
Needle 27–30 gauge

Video
Vertical lip linear



Technique DHAC
Insertion site Lateral of the oral commissure
Injection depth and direction Under the skin surface above the orbicularis oris muscle in a fan shape towards the centre of the lips
Volume 0.2–0.3 ml per quadrant
Needle 22–25 gauge cannula

Video
Lip DHAC

Treatment – lip volumisation

Linear technique

The red lip is treated over the ring muscle. The preparation can be carefully injected using the horizontal linear technique or alternatively using the vertical linear technique (small illustration). Before augmentation of the red lip, the lip base should first be enlarged if the lip white lacks substance.

DHAC

Alternatively, and for a particularly low-injury and even result, treatment of the red lip can be carried out using a blunt microcannula. The volume of material injected under gentle mobilisation should be between 0.2 and 0.3 ml/quadrant.

Treatment procedure

- Medical history: e.g. recurrent herpes infections (herpes prophylaxis with acyclovir if necessary)
- Make-up removal
- Disinfection
- Anaesthesia (local or conduction)
- Injection: Linear technique, DHAC
- Massage/modelling of the filler
- Cooling after treatment
- Patient information for behaviour after treatment
- Scheduling of a check-up appointment

Selection of preparations

3 Filler for deep augmentations (p. 68)
B Special indication: Lips (p. 73)

Medium cross-linked hyaluronic acid preparations are the most suitable due to their consistency and durability.

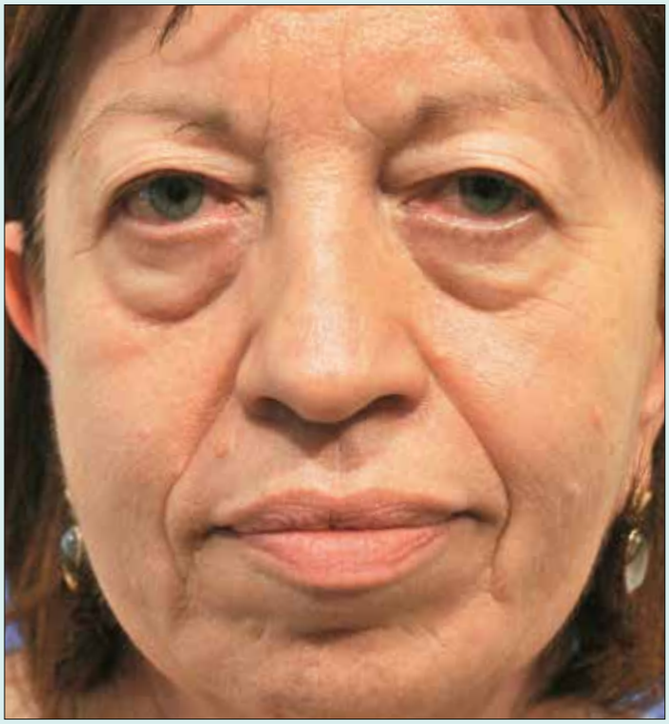
Complications/dealing with complications

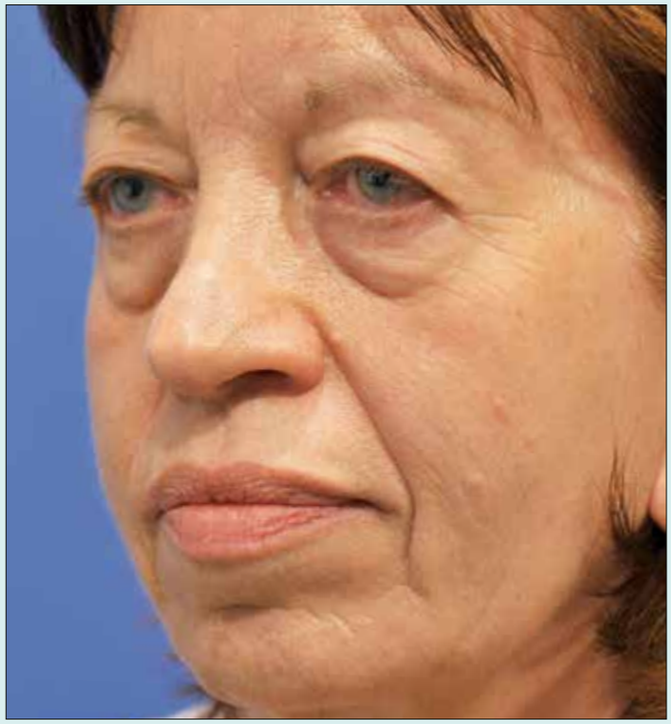
- The problem of an overstretched lip base should be avoided by performing supramucosal volume augmentation in the white lip area before augmentation of the red lip. The normal lip is given a wider distribution surface over which subsequently applied material can be presented more predictably.
- Aggregation of the substance used can lead to the formation of palpable nodules or strands, depending on the injection technique. A modulating massage of the injected material directly after the injection leads to an even distribution.
- Inflammation may occur in the area of the inserted substance.
- Do not inject a visible or palpable strand; massage the injected substance thoroughly.

Practical tip

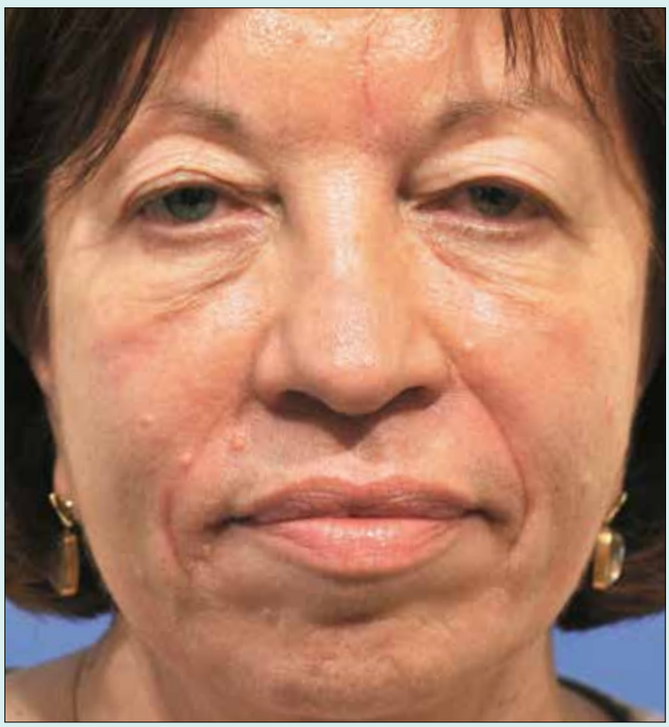
- By widening the distribution base in the white lip area, the lip volume is naturally increased, which means that augmentation of the red lip may even be unnecessary. If the result is not yet satisfactory, the most homogeneous lip projection can be achieved with DHAC.
- Contouring and volumisation of the lip influence each other. Accordingly, if both are required, the contour should be treated first.
- The lip should remain functionally natural, for example when speaking, and feel natural, for example when kissing.
- Often only one session is required for a good treatment outcome.
- In order to achieve a natural result, little to no material should be applied to the lateral third of the lip red.
- Due to the high sensitivity to pain in the mouth region, local anaesthesia (see section 6.6.1, p. 104) or central analgosedation (see section 6.6.4, p. 104) should be considered if necessary.

Case 3: Severe loss of volume in the midface



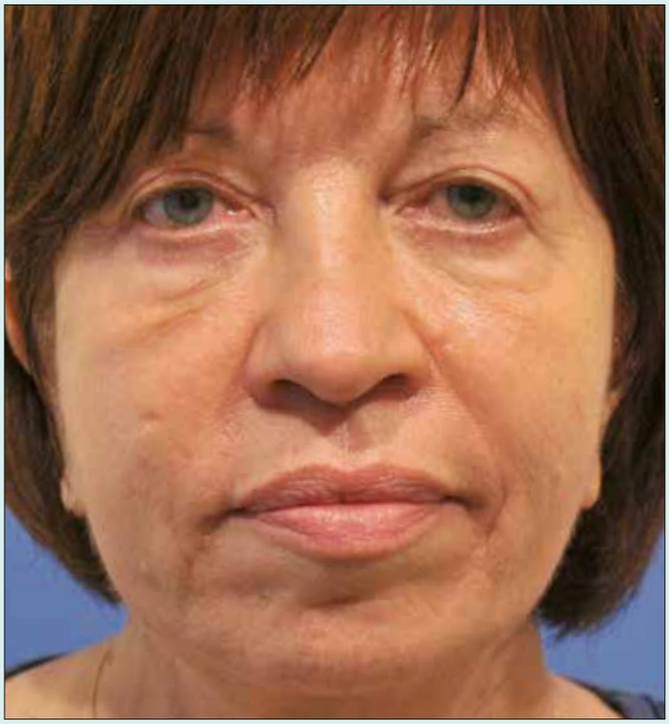


60-year-old woman. Initial findings: pronounced elastosis and severe loss of volume, emphasised in the midface.

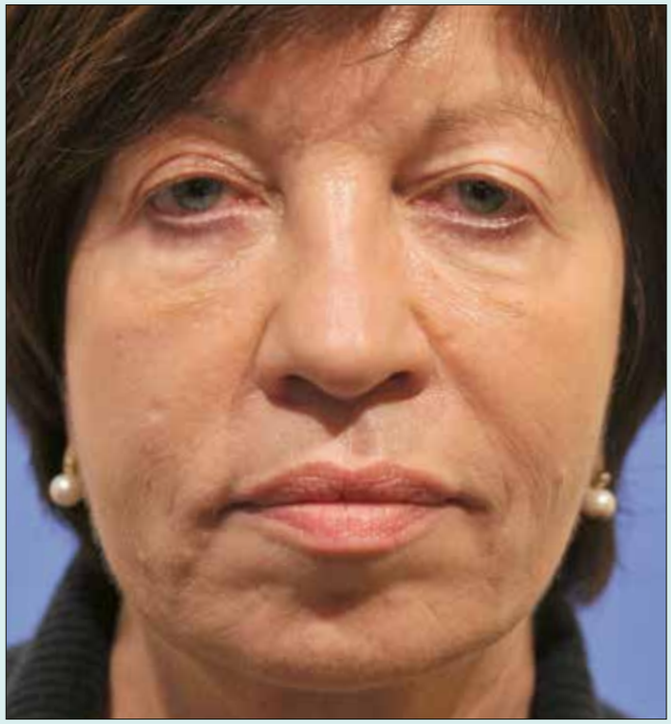


Condition 17 days after initial treatment with 8 ml hyaluronic acid using the vertical injection technique and botulinum toxin A in the upper third of the face, before upper eyelid blepharoplasty.

Case 3: Long-term course



2.5 months after the start of treatment, start of follow-up treatment with 1.5 ml hyaluronic acid.



5 months after the start of treatment. Interim assessment recorded as a planned primary closure, with the arrangement to perform a long-term evaluation after one year.

1 year control, no further treatment. Nevertheless, continuous improvement of the skin condition was observed.

3 years after the start of long-term monitoring. Findings after four subsequent injections with 1.5/1/1/2 ml hyaluronic acid (semi-annual to annual intervals) and two botulinum toxin A treatments in the upper third of the face.