Original Contribution

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Global, 3-dimensional approach to natural rejuvenation: part 1 – recommendations for volume restoration and the periocular area

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Summary

Background New techniques and products have lead to a global approach for the treatment of signs of aging. However, there is little published literature on the procedures involved in this approach and currently no validated recommendations exist.
Objectives To provide a detailed, practical guide to midfacial volume restoration and rejuvenation of the periocular area based on expert consensus recommendations.
Methods The expert committee took into account both volumetric and dynamic aspects of treatment, as well as benefits of treatment combinations, for example, combining OnabotulinumtoxinA with hyaluronic acid (HA) fillers and volumizers. An aging severity scale was established for each area, together with recommendations of appropriate products, doses, site, depth, and injection techniques, as well as rules to be respected.
Results The expert group concluded that volume restoration of the midface is the first essential step in the global approach because treatment for this area has the most significant positive impact. Firstly, it is important to restore the malar contour, as malar volume anchors the structure of the midface. Secondly, an assessment of the effects of malar enhancement on the appearance of the nasolabial folds and the nasojugal fold (tear trough) should be conducted because these aging signs may be decreased by malar enhancement. Finally, treatment for the nasolabial folds and periorbital area with HA should be performed when needed.
Conclusions Practical guidance is provided for midfacial volume restoration and rejuvenation of the periocular area based on validated expert consensus recommendations. This will help esthetic facial physicians to achieve optimum outcomes.

Keywords: facial rejuvenation, global approach, periocular, volume restoration, Faceculpture®

Introduction

There is an ever increasing demand for natural facial rejuvenation, and the introduction of injectable products such as botulinum toxin and hyaluronic acid (HA) fillers, either used alone or in combination, has

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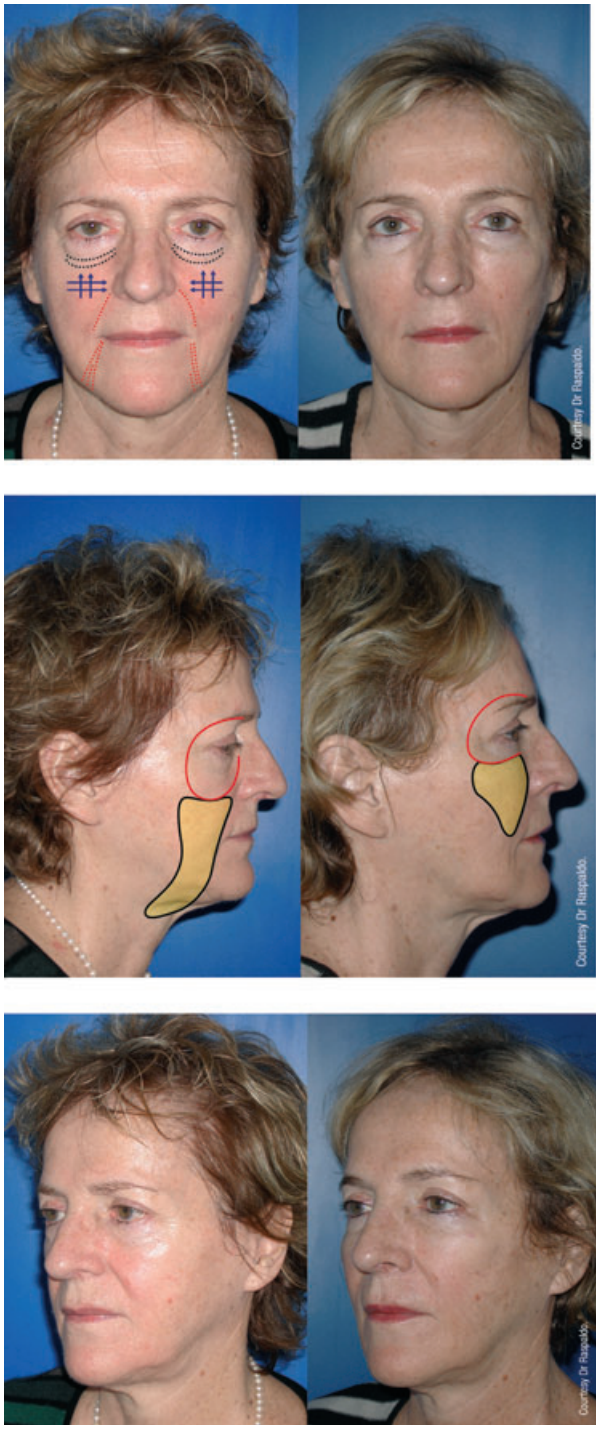

Figure 1 Case study. Left-hand photos before treatment: right-hand photos after treatment. Black: 0.3cc Juvederm Ultra 2 in tear trough. Blue: 2cc Voluma in malar-cheek-midface. Red: 0.8cc Juvederm Ultra 3 in nasolabial folds; 0.8cc Juvederm Ultra 4 in the ovale contour-bitter lines; 0.6cc Juvederm Ultra Smile in lips; 20U Vistabel in glabella.

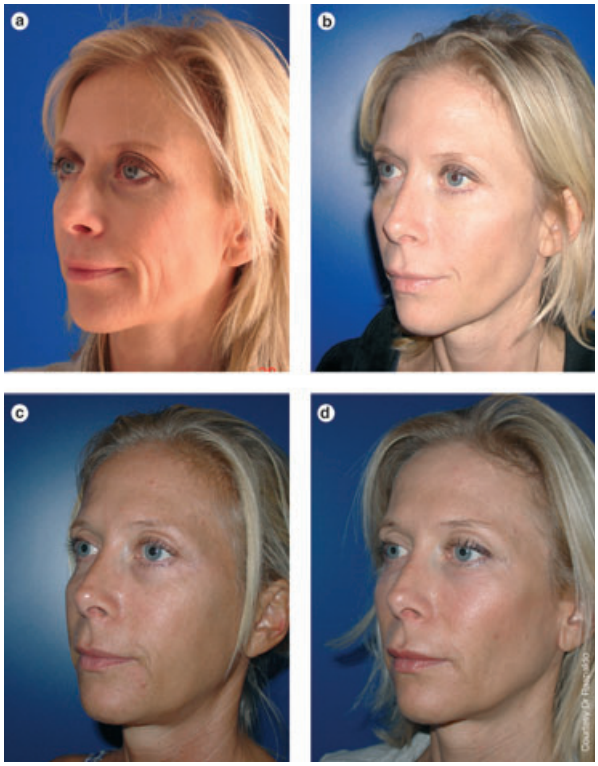

Figure 2 Case Study. (a): Before any injection. (b) After treatment with 0.3 cc Juvederm Ultra 2 in the tear trough + 0.4 cc Juvederm Ultra 3 in the nasolabial folds and jowls. (c) After 20U Vistabel in the glabella. (d) After 1 cc Juvederm Voluma in the midface (malar).

changed the treatment of the signs of aging, particularly the correction of hyperdynamic and static lines. New techniques for volume restoration have resulted in treatment moving toward a global, 3-dimensional and multi-site approach[1,2] comprising muscle relaxation, filling, and volumizing. This approach has emerged due to a better understanding of the physiology of the aging process and systematic clinical evaluation of existing signs of aging, volume loss, and individual anatomical variations. However, there is currently little published literature on the techniques involved in such a global approach, and no validated recommendations on the management of facial rejuvenation exist to advise esthetic physicians on the best products and injection techniques to use to optimize patient outcomes.

In 2010, a major initiative was undertaken by an expert panel of esthetic physicians in France whose aim was to develop these practical recommendations. A formalized methodology was derived from the

Research ANd Development (RAND) Corporation,[3] which was developed and validated by the French National Authority for Health [Haute Autorité de Santé (HAS)].[4] This group was formed to provide guidance on the management of global, 3-dimensional and natural facial rejuvenation techniques, in line with current clinical practice. Two general concepts were validated by the expert panel: (i) the benefits of combining botulinum toxin and HA and/or volumizing fillers and (ii) a treatment plan and its sequence based on an innovative facial segmentation in four esthetic units adjusted by severity stages. These recommendations were to cover the use of injectable products (specifically OnabotulinumtoxinA [Allergan Inc] and fillers) and were to also take into account the presence of existing severity scales for aging.

This study provides the expert panel's detailed recommendations and practical guidance for midfacial volume restoration and rejuvenation of the periocular area. Firstly, it was considered important to correct the midface volumes, followed by rejuvenation of the eye area followed by the rejuvenation of the perioral area. Then, if necessary, by the remodeling of other structures (nose and ears), depending on the patient's needs.

Table 1 Severity scales for signs of aging

Anatomical site	Selected scale	Definition of severity stages
Facial wrinkles: Glabellae Crow's feet	Lemperlé's Scale for all wrinkles[4]	Scale with definitions and morphed photographic documentation: Stage 0: No wrinkles Stage 1: Just perceptible wrinkles Stage 2: Shallow wrinkles Stage 3: Moderately deep wrinkles Stage 4: Deep wrinkles, well defined edges Stage 5: Very deep wrinkles, redundant fold
Midface volume and contour	Raspaldo's scale for the loss of malar volume[9]	Scale with definitions and morphed photographic documentation: Stage 1: Normal Stage 2: Discrete appearance of the tear trough and slight descent of malar fat Stage 3: Worsening of dark circles and slight atrophy of jugal fat Stage 4: Atrophy and facial skeletisation
	Raspaldo's scale for the loss of temple volume[23]	Scale with definitions and morphed photographic documentation: Stage 1: Normal Stage 2: Beginnings of temporal concavity Stage 3: Marked temporal depression Stage 4: Temporal skeletisation
Eyebrow position	Carruthers' scale[6]	Scale with definitions and morphed photographic documentation: Stage 0: Youthful, refreshed look and high-arch eyebrow Stage 1: Medium-arch eyebrow Stage 2: Slight arch of the eyebrow Stage 3: Flat arch of the eyebrow, visible folds, and tired appearance Stage 4: Flat eyebrow with barely any arch, marked visible folds, and very tired appearance
Subpalpebral hollow (lower eyelid)	Raspaldo's scale (unpublished)	Morphed photographic documentation: 4 stages: Subpalpebral hollow: without pocket, with shade or beginning of pocket
Hollow eye (upper eyelid)	Raspaldo' s scale (unpublished)	Morphed photographic documentation: 4 stages: Hollow eye (upper eyelid): increased concavity (presence of shadow)

Materials and methods

The methods used are briefly summarized below.

The approach of the expert panel was implemented in 4 stages. Firstly, an expert Steering Committee met to establish methodology and define objectives. Each expert had at least 20 years of experience with dermal fillers and they drew on their own extensive experience to initially assess a panel of similar clinical cases. These cases comprised Caucasian men and women of any age who were treated with injectable products and were selected according to signs of aging of varying severity that were considered representative of cases seen in clinical practice. These assessments were then consolidated by a critical analysis of available MedLine medical literature from 2005 to 2010 investigating the global treatment approaches and the severity scales used for the different stages of aging. An in-depth analysis of existing severity rating scales was performed, and the most appropriate scale was selected for each indication according to anatomical site (Table 1).[5,6]

The next step was to then establish the global therapeutic approach. This took into account both volumetric and dynamic aspects of treatment, as well as the benefits of treatment combinations, for example, combining OnabotulinumtoxinA with monophasic HA fillers and volumizers to achieve the optimum natural result. The findings were documented systematically with a clinical definition of the aging severity scale, together with a recommendation of appropriate products, doses, site, depth, and injection techniques, as well as indication-specific rules to be respected and other comments.

The Steering Committee then selected 52 experts from the field of facial rejuvenation in France to participate in one of 6 regional meetings to score the recommendations according to their own clinical experience. Only experts with relevant experience in the specific indication under review were invited to participate in the assessment. These experts had at least 15 years of experience in administering injections and treat, on average, a minimum of 1500 cases per year, representing in excess of one million procedures. Furthermore, they started using the Juvéderm (JU) family of products, comprising monophasic cross-linked fillers, in 2001, representing 10 years of experience with these products. Proposals were rated by the experts from 1 (total disagreement) to 9 (full agreement). When the final score was below 7, a new recommendation was proposed and discussed.

Step 3 then comprised statistical validation of the results obtained (Table 2). All ratings obtained by the expert committee were analyzed using R software (version v2.11.1) from an algorithm developed by Methodomics Sarl (Mortagne-sur-Sévre, France). In accordance with the HAS recommendations, each item was statistically evaluated and was considered validated when 85% of participants agreed with the statement or, in the absence of any disagreeing participants, when 80% agreed. The reliability of between-participant agreement for the rating of each

Table 2 Statistical validation of assessment results and concordance analysis for between-participant agreement for rating of consensus items

Item	No response (%)	NonIndication (%)	Indecision (%)	Indication (%)	Statistical validation HAS	κ	*P*-value	Landis + Koch classification
Volume restoration								
Malar volume restoration	5 (9.62)	0 (0)	9 (19.15)	38 (80.85)	Validated	0.56	<0.001	Mod
Periocular rejuvenation								
Frontal horizontal lines	5 (9.62)	0 (0)	3 (6.38)	44 (93.62)	Validated	0.72	<0.001	Good
Glabellar rhytides	2 (3.85)	0 (0)	5 (10)	45 (90)	Validated	0.75	<0.001	Good
Crow's feet rhytides	7 (13.46)	0 (0)	8 (17.78)	37 (82.22)	Validated	0.54	<0.001	Mod
Temple volume loss	26 (50)	0 (0)	3 (11.54)	23 (88.46)	Validated	0.44	<0.001	Mod
Brows	15 (28.85)	0 (0)	2 (5.41)	35 (94.59)	Validated	0.53	<0.001	Mod
Periocular area, infraorbital hollow	6 (11.54)	0 (0)	3 (6.52)	43 (93.48)	Validated	0.69	<0.001	Good
Periocular area, suborbital palpebral hollow	36 (69.23)	0 (0)	3 (18.75)	13 (81.25)	Validated	0.54	<0.001	Mod

Classification of Landis and Koch[7]: Excellent = κ value >0.8; Good = κ value 0.8–0.6; Moderate = κ value 0.4–0.6; Poor = κ value 0.2–0.4; Bad = κ value 0–0.2; Random = κ value 0; Negative = κ value < 0.

Table 3 Restoration of midface volume

	Severity of volume change in the facial middle third		
Stage/indication	2	3	4
Products	JU4/Voluma	Juvéderm Voluma	
Dose	JU4: 0.4–0.8 mL/side Voluma: 1–2 mL/side	2–3 mL/side	3–5 mL/side
Sites	Malar area		
Injection technique	Injection method: Voluma (2 cc syringe): needle 23G thin wall or cannula 18G, 22G Voluma (1 cc syringe): needle 27G ultra thin wall or cannula 25G JU4: syringe of 1 mL/needle 27G ultra thin wall or cannula 25G Depth of injection: Deep injection under the orbicularis muscle, under or in the malar fat pad and under or in the suborbicularis oculi fat pad Injection modality: Fanning injection or serial puncture with multiple deposits (bolus)		
Rules to be respected	Avoid injecting a large bolus (not more than 2 mL by injection point) Anatomic zones: orbits – do not try to inject under the periosteum; avoid the infra-orbital nerve. Injections must be lower than the orbital rim		
Comments	JU4 is selected for its precision in the corrections of minor defects. Voluma is indicated in more important volume loss, because of its rheological characteristics and volumizing capacity. Avoid overcorrecting. It is possible to treat in 2 sessions, taking into consideration each specific case (e.g. facial morphology, skin thickness, degree of response etc.).		

item was assessed using the Fleiss Kappa method. The kappa statistic calculates the nonrandom extent of agreement and is scored between 0 and 1. The interpretation of the κ value is based on the classification established by Landis and Koch.[7] To assess the statistical significance of the κ values, 95% confidence interval and *P*-values (corresponding to the null hypothesis H0: $K = 0$) were provided.

Finally, step 4 consisted of the Steering Committee finalizing the recommendations by integrating their findings with those from the regional boards.

Results

Volume restoration

Although the eyes are generally the first facial area to be affected by the signs of aging,[8] the expert consensus group concluded that volume restoration of the midface is the first essential step in the global approach. This is because treatment of this area has the most significant positive impact on the face, which together with improved skin radiance leads to an immediate rejuvenation and improves patient motivation and satisfaction.[2,9–11]

An attractive face is generally characterized by smooth, round contours, high cheekbones, oblique, hollow jowls and a thin, well-defined jawline. These features are known as the "triangle of beauty" with its base at the top and summit below.[12,13] However, as people age, the bony skeleton and soft tissues of the face lose volume, droop and shrink, thus producing a wider orbital aperture and less anterior projection.[14] Moreover, the illusion of descent is often a manifestation of regional volume depletion,[15] thus an increase in volume is a key part of facial rejuvenation,[1,9,13,15–18] particularly in areas where soft tissue loss or inadequate volume is important, such as the nasolabial folds, hollow eyes or sagging malar areas, due to the reduction of malar fat.[9]

It is important to note that none of the reviewed publications differentiated treatment recommendations according to the severity of volume depletion, other than mentioning the need for adjustment of injection volumes according to volume loss. Neither does the literature stress the importance of a tailored treatment plan with an appropriate treatment sequence,[19] optimum product choice and the need to avoid overcorrection.[19,20] One of the most important outcomes from the expert consensus group is the development of comprehensive recommendations and technical specifications for each stage of volume depletion, thus allowing optimal individualization of treatment to meet patients' needs. The expert consensus group recommends a step-wise treatment sequence.[19] Firstly, it is important to restore the malar contour, as malar volume anchors the structure of the midface. Secondly, an assessment of the effects of malar enhancement on the appearance of the nasolabial folds and the nasojugal fold should be conducted because these aging signs may be decreased by malar enhancement.[1,20,21]

Finally, treatment of the nasolabial folds and periorbital area with HA should be performed when needed.

The expert panel concluded that volume loss in the facial middle third should be treated with a thick HA gel such as JU4 or Voluma (or an equivalent alternative volumizer), depending on aging stage rated at baseline (Table 3). JU4 is recommended for more minor defects (stage 2) at a dose of 0.4–0.8 mL per side, while Voluma is recommended where there is more significant volume loss (stages 3 and 4) at a dose of between 2 and 5 mL per side. Thus, baseline aging severity determines the appropriate choice of treatment product. Each product should be injected deeply under the orbicularis muscle, and both under or in the malar fat pad and subocularis oculi fat. However, it is very important to avoid over-correction, with treatment best being administered over two sessions, depending upon individual patient characteristics and requirements.[2]

Periocular area

For the second phase of treatment, the expert panel recommends treatment of the periocular area. Until recently, treatment of this area relied essentially on injection of the lateral orbicularis muscle with OnabotulinumtoxinA and HA filler into the subpalpebral hollows. OnabotulinumtoxinA is considered the "gold standard" for nonsurgical treatment of the upper face, as it reduces the facial rhytides, widens the eyes and leads to a smoother, more youthful appearance.[1] Treatment can be supplemented with other fillers, depending upon specific patient needs,[1] and this offers further refinement and elimination of facial wrinkles.[17] Three-dimensional shaping of the brow region is best performed using a combination of OnabotulinumtoxinA and fillers,[1] whereas hollow temples caused by fat atrophy respond well to HA treatment.[20,22,23] However, the expert panel recommends the use of a more global approach for periorbital rejuvenation. It recommends using a combination of OnabotulinumtoxinA and HA filler administered to restore eyebrow harmony, reduce crow's feet rhytides, and increase periorbital volumes, specifically hollow temples.

Horizontal forehead lines

Wrinkles can be either dynamic or static and they result from volume loss of the underlying tissue (Table 4). However, it is important to differentiate between the wrinkle types to select the best treatment (e.g. dynamic wrinkles respond best to OnabotulinumtoxinA [20]). The consensus group considered JU2 to be the HA fillers of choice for horizontal forehead lines as they can be easily adapted and are gentle products. The fillers are best administered by linear threading using a layering technique, and combining HA with OnabotulinumtoxinA can maximize correction and increase the longevity of results.[8,24]

Glabellar rhytides

These are treated with OnabotulinumtoxinA alone by 75% of physicians,[1] with this treatment also being used in younger patients to eliminate the negative, often hostile, impression conveyed with dynamic frown lines[25] (Table 4). However, the expert panel concluded that combining HA with OnabotulinumtoxinA treatment can increase the longevity of benefits for up to 6-9 months[24,26] and combined results demonstrate superiority over using either product alone.[8] Treatment should be staged with use of OnabotulinumtoxinA first, then followed by HA fillers 2 weeks later for correction of residual static lines, skin creases and deep glabellar furrows.[1,7,20–22,25,27] It is important to note that this area is very sensitive to blood vessel occlusion so fillers must be applied superficially to minimize the risk of cutaneous necrosis.[1,20]

Crow's feet wrinkles

Crow's feet are generally treated with OnabotulinumtoxinA, but dermal fillers can be used to add volume and for treatment of deeper lines[8,20,21] (Table 5). Small, dynamic lines are best improved using fluid HA injected very superficially combined with OnabotulinumtoxinA injections.[22] However, there are risks associated with these treatments as OnabotulinumtoxinA may reach the zygomaticus major muscle if the injection is too deep, and the delicate nature of the skin with its rich subdermal vascular plexus means that HA treatment can result in lumps and bruising[20,26] so it is important to avoid more viscous fillers and treatment should be administered with caution.[1]

Temple volume loss

Temple volume restoration is an emerging therapeutic area for esthetic physicians, but it is important because it comprises one of the first signs of aging [23] (Table 5). Loss of volume in the temple area lateral to the tail of the eyebrow is associated with a drop in the tail of the brow. However, use of fillers in the temple area and under the lateral brow, together with a small amount of OnabotulinumtoxinA in the tail of the brow, can result in an attractive overall effect.[1] It is important when treating temple volume loss to avoid injections in the area of the projection of the frontal branches of

Table 4 Periocular rejuvenation – forehead horizontal lines and glabellar rhytides

	Forehead horizontal lines		Glabellar rhytides	
Stage/indication	1 to 5	Residual wrinkles after OnabotulinumtoxinA	1 to 5	Residual rhytides post OnabotulinumtoxinA
Products	OnabotulinumtoxinA	JU2	OnabotulinumtoxinA	JU2 or 3
Dose	1–2 U per site. Altogether 10–20 U and up to 30 U in men	0.4–0.6 mL	4–5 U per site	0.4 to 0.8 mL
Sites	3–5 points on average or more according to patient's morphology. Away from the lower 1/3 of the frontalis muscle. Injection pattern in staggered rows. Not systematically in the external 1/3	Complementary filling in the residual wrinkles	2–5 sites. 4 to 5 mm minimum above the orbital ridge. In the muscular body of corrugator ± procerus	In the wrinkle
Injection technique	Hypodermic injection. Avoid bone contact.	Injection means: 30G needle or cannula Depth of injection: Intradermal injection Injection modality: Retrotracing and/or tracing	Obliquely or perpendicular to the skin plane. Deep at the level of the bone with internal insertion and upwards injection. Hypodermic at the level of the external cutaneous insertion	Injection means: 30G needle Depth of injection: Intradermal injection Injection modality: Retrotracing and/or tracing
Rules to be respected		Avoid overcorrection		Avoid intravascular injection and hypercorrection that can induce a localised vascular compression and necrosis
Benefits of the association		In the event of brow ptosis, the combination treatment allows a satisfactory improvement in frontal wrinkles, while keeping the eyebrow lift		Synergistic effects with OnabotulinumtoxinA

the facial nerve path and to avoid temporal vessels. Injections should be administered deeply to avoid the development of lumps and bruises post-treatment due to proximity of the superficial temporal vein.[26] This technique also results in superior and a more even, homogeneous projection, that is, correction of the temporal hollow. The expert panel's recommendations propose differential treatment depending upon the degree of severity of temple volume loss.[23]

Eyebrows

There is no appropriate classification of eyebrow position severity and so no staging has been used when reaching treatment consensus (Table 6). Treatment should be administered according to individual patient requirements and specific eyebrow shape. To achieve a desirable arching contour, brow volumizing must be done with consideration of the overall 3-dimensional shape of the lateral brow.[28] Generally, OnabotulinumtoxinA is the best treatment for eyebrow lifting, and previously it has been injected along the brow to the tail at the junction with the temporal fusion line to help lift the lateral brow and restore the arch.[25,27] The consensus group, however, recommends injection along the brow in all layers (i.e. sub-dermis, intramuscular, and over the periosteum) to achieve maximum brow lifting.[8] In addition, HA dermal fillers can enhance eyebrow contour and produce volumetric improvement. The expert group therefore recommends the use of HA to improve the elevation of the eyebrow tail in cases

Table 5 Periocular rejuvenation – crow's feet wrinkles and temple volume loss

	Crow's feet wrinkles		Temple volume loss		
Stage/indication	1 to 5	Residual rhytides post OnabotulinumtoxinA	1	2	3
Products	OnabotulinumtoxinA	JU2 or Juvéderm Hydrate	JU4	JU4 or Voluma	Juvéderm Voluma
Dose	2–4 U per site	0.3–1 mL per side	$\leq$ 1 mL per side	$\leq$ 2 mL per side	$\geq$ 2 mL per side
Sites	Very superficial hypodermic injection	In the wrinkle JU2 or in the overall area Juvéderm Hydrate	In the temporal fossa (under the deep temporal fascia [23])		
Injection technique	Very superficial hypodermic injection in the orbicularis muscle. Carefully locate and avoid the vessels.	Injection means: 30-32G needle Depth of injection: Intradermal injection Injection modality: Retrotracing and/or tracing or papule (mini intradermal bolus)	Injection means: JU4: 23-27G needle/22-25G cannula Voluma: 23G needle or 23G cannula. Depth of injection: Voluma: Deep injections • Under the temporal muscle fascia, or supra-aponeurotic – within the gliding space of Merkel • Pay attention to the pathway of the facial nerve (1½ cm in front of the tragus and going up obliquely and forward, while remaining at approximately 1 cm from the eyebrow) Injection modality: bolus needle injection or fanning injection with a cannula		
Rules to be respected		Avoid overcorrection, massage carefully	Avoid injections crossing the facial nerve path. Avoid temporal vessels		
Benefits of the association		Synergistic effects with OnabotulinumtoxinA			

where OnabotulinumtoxinA proves insufficient. This combination of fillers used in combination with OnabotulinumtoxinA can produce results lasting up to 1 year.[8] It is important to avoid overcorrection of the eyebrows, because this can result in a heavy, unduly prominent appearance of the eyebrow or eyelid edema.[29] Furthermore, it should be noted that any unevenness or lumpiness in the brow will be visible due to the relatively thin skin thickness in this region, and this is particularly evident in older patients.[26]

Sub-palpebral hollow

A comprehensive review of the literature revealed that none of the available publications specifically describe treatment in this region according to the severity of the stages (Table 6). In a few publications, treatment of the subpalpebral hollow is described together with treatment of the tear trough.[8,18,22,26,28] Treatment of the subpalpebral hollow requires an in-depth knowledge of the anatomy of the area and specific training. In patients presenting with signs of early pocket (i.e. fat hernia), the aim should be to attenuate the dark circle rather than to fill the hollow; however, it should be expected that an optimal result may not be achieved. The expert consensus group recommends treatment of the subpalpebral hollow without pocket but with shadow or with the beginnings of pocket, with JU2[18,30] at doses of between 0.3 and 0.4 mL per side/session as this is an adaptable, softer product. Traditionally, the site of injection is below the lower orbital ridge. The expert consensus group recommends subpalpebral injections to recreate the subocularis fat (SOOF) pad.[9] This is achieved by injecting deep under the orbicularis muscle,[2,9,20] under or in the fat pad,[13] over the bony surface of the infra-orbital bones.[22,24,26,28] Treatment must be administered with caution in small quantities over several small steps because this is a fragile zone and the expert consensus group recommends the use of the index finger to palpate the orbital ridge and thus protect the orbit, as well as guiding the area to be modeling by the injection. Under- rather than over-correction is preferred, with correction performed over two sessions separated by a 1-month period. It should be noted that there is a significant risk of complications, including persistent eyelid edema, embolization, asymmetry, lumps, double vision, and swelling.[26]

Hollow eye (upper eyelid)

Correction of hollow eye (upper eyelid) is a little-studied indication but is one of the first areas to show signs of aging[28] (Table 7). The use of HA fillers has revolutionized the treatment for patients with sunken eyes and hollow superior upper periorbit, with treatment

Table 6 Periocular rejuvenation – eyebrows shaping and subpalpebral hollow (tear trough)

	Eyebrow shaping		Subpalpebral hollow (Tear Trough)
Stage/indication		In case of insufficient lift with OnabotulinumtoxinA	Without pocket, with shadow or with early development of pocket and hollow
Products	OnabotulinumtoxinA	JU3 or 4	JU2
Dose	2–4 U per site	0.4–0.8 mL per side	0.3 to 0.4 mL per side/session
Sites	Main injection point: 4–5 mm of the orbital ridge at the crossing of the linea temporalis. Additional injection point: 1cm more medial and/or more lateral	Triangle whose base is the tail of the eyebrow and whose apex is centred on the temporal crest (linea temporalis). From the medial part of the eyebrow to the tail of the eyebrow.	Below the lower orbital ridge
Injection technique	Subcutaneous injection with a 10° angle, and directed upwards	Injection means: 27-30G needle; 23-25-27G cannula Depth of injection: Deep injections: submuscular (frontalis and orbicularis oculi) into the sliding space of Merkel (brow) and in the fat pad of Charpy (retro-orbicularis eyebrow fat pad) Injection modality: Fanning injection (or Bolus massage)	Injection means: 30G needle or 25-27G cannula Depth of injection: • Deep injection under the orbicular muscle at bone contact (without traumatising the periosteum) Gentle injection preferably parallel to the orbital edge, remaining under the orbital ridge • Injection modality: Retrotracing and/or tracing or fanning injection with a cannula
Rules to be respected	Check frontalis muscle hyperactivity to avoid 'mefisto look'	Avoid overcorrection, to avoid heaviness and a too prominent aspect of the eyebrow, or eyelid oedema	Fragile zone: do not overcorrect, prefer under-correction and favour correction in 2 sessions separated by 1 month. Use the index finger to palpate the orbital ridge and thus to protect the orbit.
Comments	Add 1 U at 1.5 cm from the orbital rim, into the frontalis muscle	Improves the eyebrow tail lift in case of insufficient OnabotulinumtoxinA action	Requires in-depth knowledge of the anatomy and specific training. In cases of early development of pocket, one will rather seek to attenuate the dark circle rather than to fill the hollow. Do not expect an optimal result. Significant risk of persistent eyelid oedema.

remaining effective for 2–4 years. Results demonstrate that even a minor addition of volume can significantly transform a hollow and sickly appearance to that of a more youthful, healthy, and esthetically pleasing face.[28] As this is a fragile zone, a high level of expertize is required and under- rather than over-correction is desirable. It is recommended that 2 treatment sessions separated by 1 month are utilized, with judicious use of small amounts of JU2 at a dose of 0.2–0.3 mL per side. It is important not to place injections below the upper palpebral fold and injections into the eyelid must be avoided. Complications include a significant risk of eyelid edema.[31,32]

Discussion

The expert consensus approach comprises a rigorous, systemic methodology that takes into account the identification and severity of the specific facial aging signs to be corrected based on published, or generally accepted, rating scales. For each indication, the most appropriate scale was selected by an expert Steering Committee and recommendations were developed accordingly. Thus, patient management is adapted to the severity stage of aging signs of each facial area. All recommendations made by the expert group with respect to facial volume restoration and rejuvenation of the periocular area were statistically validated according to French National Authority for Health (HAS) guidelines and the reliability of between-participant agreement for the rating of consensus items was assessed using the Fleiss Kappa method according to the classification established by Landis and Koch.[7] These methodologies were used to ensure that the recommendations were robust and could be considered validated.

The expert panel used a comprehensive, 3-dimensional approach that combines three types of products:

has-sante.fr/portail/upload/docs/application/pdf/base_methodo_CFE.pdf.
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Table 7 Periocular rejuvenation – hollow eye (upper eyelid)

	Hollow eye (upper eyelid)
Stage/indication	Accentuation of the concavity (presence of a shadow) – Enophtalmia
Products	JU2
Dose	0.2–0.3 mL/side
Sites	Injection along the upper orbital ridge (palpation of the notch of the supraorbital nerve to protect the supra-orbital sensitive nerve).
Injection technique	Injection means: 30G needle or 25–27G cannula Depth of injection: • Retro-muscular injection at bone contact (preferable because of the lesser risk of bruises, but more difficult to perform if the deep anatomy knowledge is not controlled) • Subcutaneous Injection (simpler, but more painful and with more risk of bruises and oedema) Injection modality: Retrotracing and/or tracing
Rules to be respected	Fragile zone: do not overcorrect, prefer under-correction and favour correction in 2 sessions separated by 1 month. Do not inject below the upper palpebral fold. Avoid injecting into the eyelid. Significant risk of eyelid oedema, therefore do not overcorrect
Comments	High-risk zone requiring a high level of expertize

OnabotulinumtoxinA, dermal fillers and volumizers. The benefits of combined OnabotulinumtoxinA and HA filler treatments were highlighted, particularly the beneficial synergistic effects of combined treatments that can result in up to 50% improvement compared with using the products individually.[18] Combined OnabotulinumtoxinA and HA treatment leads to a rapid, temporary correction with a weak morbidity and at reasonable treatment costs.[8,21] This approach restores both dynamic and static wrinkles and volumes,[25] and enables a decreased quantity of HA to be injected.[1,8,25] Furthermore, due to the low incidence of mostly mild intensity adverse effects, this combined treatment may be used as preventative treatment in younger patients.[8] In addition to assessing the benefits of OnabotulinumtoxinA and HA fillers, the expert consensus group also considers the use of volumizers which play the key role in volume restoration.

In conclusion, the quest to deliver patient care based on the best possible scientific evidence, together with a search for improved quality, has resulted in treatment guidelines being seen as an important clinical tool.[33] The expert consensus group recommendations provide a detailed practical guide to midfacial volume restoration and rejuvenation of the periocular area based on validated findings. It is anticipated that this will prove a useful tool for esthetic facial physicians in achieving optimum patient outcomes for the future (see Figs. 1 and 2 for case studies).

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