

Mid-face Rejuvenation

Mr Dalvi Humzah and Anna Baker detail the anatomical features of the mid-face and how to successfully rejuvenate the area

Abstract

With age, the mid-face changes due to a combination of re-modelling of the maxilla and pyriform aperture, volumetric and positional changes of the superficial and deep mid-facial fat pads, and changes in skin tone and texture. It is widely accepted that these changes significantly influence many of the visual changes in the lower face. These may be effectively treated with a variety of injectable techniques to rejuvenate the mid-face. The current literature concerning the pertinent anatomy for mid-facial rejuvenation is therefore discussed within this article.

Introduction

In recent years, the way we analyse and plan the non-surgical approach to the mid-face has changed dramatically. The focus has shifted away from treating visible lines/folds as they present, and is now centred on treating the age-related changes at the root cause. The restoration of a dynamic and harmonious volume distribution is a key factor in non-surgical rejuvenation of the mid-face. There is a growing body of literature demonstrating the multifactorial nature of facial ageing. These indicate that facial analysis and subsequent rejuvenation should initially address such anatomical changes. An understanding of the anatomical changes associated with ageing is required to formulate effective strategies to rejuvenate the ageing mid-face.

Key words

Mid-face, dermal filler, anatomy, injection techniques

Boney changes

The most significant age-related change that the face undergoes concerns the underlying skeletal structure. It has been demonstrated that the facial skeleton in males and females undergo predictable patterns of bone resorption in defined anatomical regions. Shaw *et al*¹ undertook a comprehensive study comprising 120 subjects using computed tomography to analyse these changes. The maxillary angle (measured from the superior to inferior maxilla, at the articulation of the inferior maxillary wing and alveolar wing), decreased significantly with age for both male and female subjects. The maxilla has also been shown to recede more medially and inferiorly.² While the pyriform angle showed no significant change with increasing age, the pyriform aperture area increased significantly in ageing males and females.³ These changes are pivotal in the context of the ageing face as they represent a decreasing and weakening foundation on which the soft tissue structures reside. It has also been proposed that the mid-cheek is more susceptible to ageing, in view of the natural posterior incline of the mid-cheek skeleton from the relative prominence of the infra-orbital rim.⁴ Some individuals may also possess a congenitally weak or inadequate skeletal structure, which may be the primary

cause of premature ageing.³ It is important for the practitioner to understand these changes as these have implications on the impact of subsequent soft tissue descent,³ and how that may be corrected with dermal filler.

Deep fat compartments

Morphological changes of the facial fat compartments result in the loss of smooth contours and shadowing that is evident in the ageing mid-face. Gierloff *et al*⁴ consolidated findings from Rohrich and Pessa,⁵ in which they describe data from computed tomographic scans of 12 unembalmed specimens. The deep medial cheek (DMC) fat compartment is noted to have a medial and lateral component. The medial component is triangular in shape and was noted to be present in six specimens in this small cohort study. It was located beneath the nasolabial compartment and extended medially. The medial component of the DMC fat does not lie immediately on the periosteum of the maxilla. In some individuals, the lateral part of the DMC fat may demonstrate a lateral extension, located beneath the superficial medial cheek fat and the lateral boundary in the buccal fat pad. Gierloff *et al*⁶ also found the sub-orbicularis oculi fati (SOOF) to have a medial and lateral component in the majority of analysed specimens. The medial component lies approximately 3mm inferior to the lower orbital rim, immediately above the periosteum of the maxilla. The inferior portion overlaps the lateral part of the DMC fat, and the medial part of the SOOF is covered by the nasolabial and medial cheek fat. The lateral component of the SOOF is located underneath the lateral orbital compartment and the middle cheek fat. It lies above the prominence of the zygoma but does not reach the superior aspect of the zygomatic arch. It lies parallel to the medial



Figure 1: Arrows indicate the areas of the facial skeleton susceptible to resorption with ageing. The size of the arrow correlates with the amount of resorption. Image adapted from Wong & Mendleson.

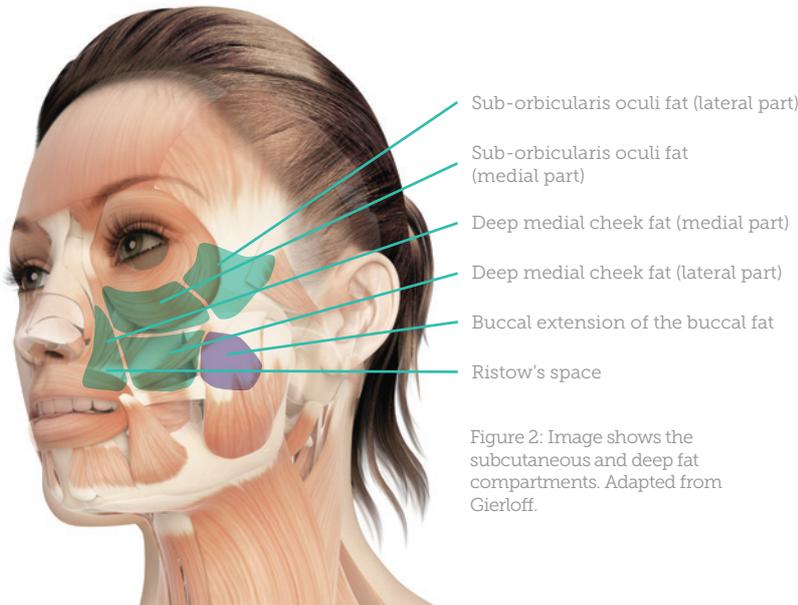


Figure 2: Image shows the subcutaneous and deep fat compartments. Adapted from Gierloff.

part of the SOOF and inferiorly to the buccal fat pad. The SOOF holds significance in the context of treating the mid-face with dermal fillers and practitioners are advised to avoid inadvertent placement of product in this plane. Doing so may precipitate the onset of malar oedema, in part due to injury to the lymphatics within the SOOF, which can be challenging to correct, may not resolve with time and may result in an unsightly aesthetic outcome.⁶

The authors conclude from this study that the pivotal findings in relation to the mid-face confirm an inferior migration of fat compartments, which can accentuate the nasojugal fold and nasolabial fold. An elevation and reduction of the nasolabial fold can be achieved by augmentation of the medial part of the DMC fat.

Subcutaneous fat compartments

Rohrich and Pessa⁷ indicate that the subcutaneous layer of the face has two components: the subcutaneous fat, which provides volume, and the fibrous retinacular cutis, that binds the dermis to the underlying superficial musculoaponeurotic system. They established the subcutaneous facial fat to be partitioned into discreet compartments using methylene blue dye. It is known that there is a general weakening of the retinacula cutis structure in the subcutaneous tissue.⁵

The study confirmed that the nasolabial fat compartment is bound laterally by the medial cheek fat and the sub-orbicularis oculi fat. The orbicularis retaining ligament represents the superior border

of this compartment and the lower border of the zygomaticus major muscle is adherent to this compartment.⁷ The maxilla and a compartment lateral to the philtrum build the medial border, and, in some specimens, the nasolabial fat was noted to overlap the medial cheek fat inferiorly. Rohrich and Pessa⁷ identified three cheek fat compartments; the medial, middle and lateral temporal cheek fat. Medial cheek fat was consistently noted lateral to the nasolabial fold, bordered superiorly by the orbicularis retaining ligament and the lateral orbital compartment. Jowl fat lies inferior to this fat compartment. Middle cheek fat was located superficially in its mid-portion, anterior and superficial to the parotid gland. The zygomatic ligament was located as a point of adherence where these compartments meet.⁷ The lateral temporal-cheek compartment is the most lateral compartment of cheek fat. This lies immediately superficial to the parotid gland and superficial musculoaponeurotic system

(SMAS) and was consistently found to connect the temporal fat to the cervical subcutaneous fat.⁷

The study findings demonstrate volume loss of the superior part of the nasolabial and medial cheek fat, which will consequently worsen the appearance of the tear trough deformity, the nasojugal fold, and the palpebromalar groove. The volume increase of the inferior part of the nasolabial fat will lead to a pronounced nasolabial fold and a pronounced superior jowl.⁷

Facial retaining ligaments

The zygomatic ligament is one of the major ligaments supporting the facial soft tissues but develops only minimal laxity between its origin and connection to the SMAS.⁵ This is in contrast to other ligaments, such as the masseteric ligaments below the oral commissure, which generally weaken and stretch with age.¹⁰

Rejuvenation techniques

During aesthetic treatment, validated facial assessment scales are useful tools for the practitioner and patient to use to establish a mutual agreement on a desired outcome, as well as managing expectations from treatment. Validated facial assessment gages such as the Merz Scales can be very useful.¹¹ Once the hair is fastened away from the face and the skin cleansed with a chlorhexidine-based solution, the practitioner is advised to topographically identify key mid-facial anatomical landmarks. The infraorbital rim is marked and the foramen may be located 3-5mm inferior to the orbital rim, aligned to the medial limbus.¹² The inferior and superior borders of the zygomatic arch are delineated as well as marking an ala-tragal line. This is to guide the practitioner in terms of the safe depth of product placement; a supraperiosteal approach cephalic to the line and a subdermal approach caudal to the line.¹³ Augmenting the lateral aspect of the face provides a natural enhancement.¹⁴ A safe deep plane to place product using a cannula approach is the pre-zygomatic space.¹² The roof of the space is formed by skin, subcutaneous fat and orbicularis oculi and this plane is deep to the

It has been demonstrated that the facial skeleton in males and females undergo predictable patterns of bone resorption in defined anatomical regions



SOOF, which is of key importance in terms of minimising the risk of complications. Product inadvertently placed into the SOOF may precipitate malar oedema. With this in mind, a cannula approach, supraperiosteally, will ensure that product remains in a safe plane.⁸ Vectors may be placed using a cannula approach, commencing at the zygomatic arch, supraperiosteally, to provide structural support to restore lateral definition along the zygoma. If the soft tissue descent extends to the medial cheek, further vectors may be placed within the subdermal plane. The advantage of using a biostimulatory product, such as calcium hydroxylapatite, allows a tightening effect in the soft tissues, due to the neocollagenic effect of the calcium microspheres.¹⁴ Suitable products would require a good lifting capacity, such as volumising hyaluronic acid dermal fillers. An advantage of a cannula approach in the mid-face means there may be less chance of compromising significant anatomical structures, such as the transverse facial artery and branches of the facial nerve, which reside at a deeper plane at this anatomical region, and are deep to the SMAS.¹²

A number of techniques are described to restore a youthful eminence to the anterior mid-face. Augmentation of the DMC fat compartment is increasingly acknowledged to be an effective approach to enhance anterior facial projection.¹⁵ The aim of correction involves an approach to place a viscous dermal filler at the superolateral portion of the maxilla, requiring minimal product volume to effectively improve the appearance of the nasolabial fold, nasojugal groove, as well as lifting the nasolabial. The volume of required product may vary depending upon the type of product used. In addition, this deep approach will also provide structural support to the maxilla and soft tissues, without compromising any anatomical structures, by using a cannula or needle approach. A subtle correction is advised, as over-treatment may result in an unnatural and disproportionate anterior fullness. This technique may be further complimented by effacing nasolabial shadowing at the pyriform aperture, using a perpendicular approach with a bolus at the alar. This will add structure to the bony changes at the pyriform and support the soft tissues, without compromise to the alar/sill artery, which resides superficially, in the subcutaneous plane.¹⁶ Lee *et al*¹⁷ consolidated earlier studies analysing the depth and anatomical location of the facial artery. The location in the nasolabial region has been inconsistently described.¹⁸ The findings from Lee *et al*¹⁷ indicate that the location may be superior, inferior and along the nasolabial fold, which is a key consideration for practitioners involved in augmenting this region. Placing product intradermally along the nasolabial fold will not compromise the artery. An injectable technique designed to place the product intradermally is the blanching technique,¹⁹ for use with cohesive polydensified hyaluronic acid. We recommend a 30g needle, placed almost parallel to the skin at an angle of approximately 10-12 degrees is used. Multiple punctures are placed closely together, creating small beads and multiple punctures are repeated until the wrinkle has been effaced. It is important to note that the blanching technique is only suitable for cohesive polydensified matrix hyaluronic acid due to the unique tissue integration properties.¹⁸

Conclusion

A detailed and meticulous analysis of the face is imperative to ensure that the treatment plans achieve a balanced and harmonious result. The practitioner requires an advanced anatomical understanding to appreciate the multifactorial age-related structural changes to the facial skeleton. Anatomical literature will continue

to evolve to shape our understanding of the ageing face and practitioners are advised to remain abreast of new findings.



Anna Baker is a dermatology and cosmetic nurse practitioner. She works alongside Mr Dalvi Humzah and is the coordinator and assistant tutor for Facial Anatomy Teaching. Baker has a postgraduate certificate in applied clinical anatomy, specialising in head and neck anatomy.



Mr Dalvi Humzah is a consultant plastic, reconstructive and aesthetic surgeon and medical director of AMP Clinic in Oxfordshire. He also runs the award-winning Facial Anatomy Teaching course and the Aesthetic Clinical Training Course. Mr Humzah worked as a consultant plastic surgeon in the NHS for 10 years and teaches nationally and internationally.

Anna Baker will be on the 'Forehead, Temple and Brow' panel, Mr Dalvi Humzah will be on the 'What to do with the Mid-face', 'Enhancing the Eye', 'Perioral Area and Lips' and 'Lower Facial Contouring: Chin and Submental Region' panels at the Aesthetics Conference and Exhibition 2016. To find out more, visit www.aestheticsconference.com/programme

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