

Lip Augmentation: an art and a science

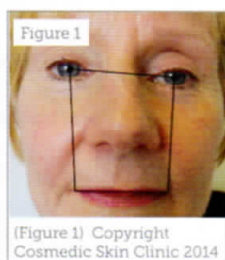
Sharon King discusses the anatomy and physiology of the lower face in relation to lips

INTRODUCTION

Lips are viewed by many as the most beautiful feature of the face. Aesthetically, they provide a focal point of beauty and, functionally, they are part of the apparatus of speech in addition to providing a visual display of varied human emotions. Patients often have a clear idea of what look they want before seeking treatment of the lips with dermal fillers, although this may not always be ideal. Patients who want to look like a favourite celebrity or those asking to look significantly younger pose a challenge to any practitioner as the shape of the lip alters with age and lip volume naturally decreases. Critical changes in the perioral area can include vertical rhytids, increased prominence of nasolabial folds (the crease that runs from nose to the corner of the mouth), ptosis of the oral commissures (sagging of lines from the corners of the mouth), thinning of the lips, and flattening of the upper lip with less definition of the Cupid's bow.¹ Rejuvenation of the lips is a commonly requested and frequently performed procedure with numerous strategies available to practitioners. Common approaches include adding volume to the body of the lips or accentuating the vermillion border (lipline) usually through the injection of dermal fillers or enhancement of the lip line using semi-permanent makeup. Volume is added to create a more protruding and pouty lip, based on the fundamental belief that volume loss is a significant part of the ageing process.

ASSESSMENT AND MEASUREMENT

Before proceeding with lip enhancement there are a few basic rules that should be considered. The Ancient Greeks are accredited with applying the 'Golden Ratio', with canons dictating that the lower lip should be 1.614 times as thick as the upper lip and that the upper lip should protrude 2mm further than the lower lip. We should observe these rules when looking at aesthetic enhancement to maintain a natural look and balance for the face.²



(Figure 1) Copyright Cosmedic Skin Clinic 2014

- In general the distance between both oral commissures should be equal to the distance between both mid pupil points if the four points were linked to form a square⁵ (Figure 1)
- In Caucasians the proportion of the upper lip in relation to the lower lip should be 1 to 1.618mm (other ethnicities may have dimensions approaching 1 to 1).
- The height/volume of the upper lip should be between 0.65-0.85 that of the lower lip. Although men have relatively thinner upper lips than women, the ratio in both genders is similar.
- A well-shaped cupid's bow with full philtral columns is the ideal.³

Several other methods have been used for evaluating lip position and its influence on facial profile. Among the most popularly referenced are Rickett's 'E' line, Steiner's 'S' line, Holdaway's 'H' line, Burststone's



'B' line and Sushner's tissue nasion-chin line 'S2'. (Figures 2-6) Naidu, while studying the consistency of the five reference lines, found that the S2 line, the E line and the B line had the smallest variation and therefore provided the best reference lines in judging the horizontal position of the lips in profile.⁴

Rickett's line (Figure 2) shows the relationship of the lips in relation to the nose and chin. Although the upper lip should protrude slightly more than the lower lip in the vertical plane (1-3mm), for aesthetics there should be a 4mm space and 2mm space between the maximum protuberance of the upper and lower lips respectively. Burststone's B line (Figure 5) joins the soft tissue sub nasally and the skin pogonion (with the mid point of the chin as its lower point of reference). Sushner's line (Figure 4) is drawn from the soft tissue nasion (the bridge of the nose) to the soft tissue pogonion. Holdaway's line (Figure 6) is a line drawn from the soft tissue pogonion to the upper lip.⁵



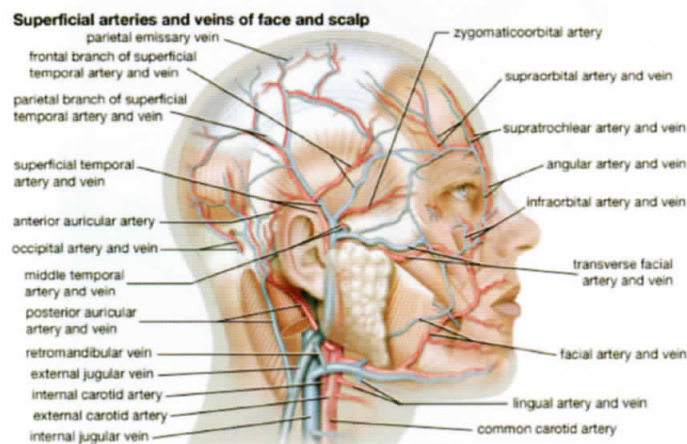
The height of the upper face, mid face and lower face should be approximately equal to maintain symmetry. The lower face can be split into thirds, with the upper third being the sub nasal point to the mouth (ideally 1.1cm) and the lower two thirds, the mouth to the chin. On projection the upper lip should project 1-2 mm forward from the lower lip.²

Some common errors that tend to lead to poor aesthetic results include:

1. Treating the vermillion border only, particularly in older patients
2. Placing too much product in the centre of the lips
3. Failing to achieve balance by over injecting the upper lip versus the lower lip or vice versa
4. Placing product throughout the lips without paying attention to defining features creating shapeless lips
5. Injecting too much dermal filler in general
6. Not retaining balance with the surrounding structures in the perioral area or the face in general.² For example over projection of the lips, giving the all too familiar 'trout pout'

PHYSIOLOGY

Before performing a lip augmentation using dermal fillers, it is essential to understand the anatomy. An unqualified or inexperienced injector is more likely to inject into the wrong tissue plane resulting in an unsatisfactory treatment or cause complications by injecting dermal filler into muscle or a



(Figure 7) © 2008 Encyclopedia Britannica, Inc.

neurovascular vessel. A good understanding of the anatomy of the lip and lower face, and the application of the fundamental rules of measurement, will also enable the practitioner to achieve a result that is aesthetically pleasing with less risk of the errors referred to above, thus providing a safer outcome and more effective treatment. If we were to dissect the tissue of the human lip, we would find that from superficial to deep, the layers of the upper and lower lips include the epidermis, subcutaneous tissue, orbicularis oris muscle fibres and mucosa. In cross section, the inferior and superior labial arteries run their course between orbicularis oris muscle fibres and the mucosa. Minor salivary glands are present within the lip itself but are absent from the vermillion border.

BLOOD SUPPLY

Blood is supplied to both lips from the external carotid artery, which ascends from the facial artery in the neck over the middle of the mandible. The facial artery runs deep in the platysma, risorius and zygomaticus major and minor muscles and superficial to the buccinator and levator anguli oris where it branches into the inferior and superior labial arteries. The superior labial artery is located around 1cm above the oral commissure and the inferior labial artery

A good understanding of the anatomy of the lip and lower face, and the application of the fundamental rules of measurement, will also enable the practitioner to achieve a result that is aesthetically pleasing with less risk of the errors

around 1.5cm inferior to the oral commissure. The facial artery then carries on to the nasolabial groove as the angular artery forming branches to the alar and anastomosing with the dorsal nasal artery.

NERVE SUPPLY

Motor nerve supply is provided via the seventh cranial nerve (Facial Nerve), whilst sensory function of the perioral region is provided via the maxillary and mandibular branches of the fifth cranial nerve (Trigeminal Nerve). The infraorbital nerve is a terminal branch of the maxillary nerve and exits via the infraorbital foramen, which is situated below the infraorbital rim. This usually lies in the mid-pupillary line and it runs beneath the levator labii superioris and superficial to the levator anguli oris to supply the lateral nasal sidewall, alar, columella, mid cheek and upper lip. The lower lip and the chin receive their sensory supply from branches of the mandibular nerve. A further branch of the mandibular nerve, the alveolar nerve travels through the body of the mandible and exits via the mental foramen, this is located below the apex of the second premolar with a variance of 6-10mm laterally. The nerve is located in the mucosa as it exits the foramen and can often be visible in the mucosa. Having taken in to consideration the nervous and venous supply to the lips and lower face, next we give consideration to the muscles of the lower face. A better understanding of the function of each of the various muscle groups and their intersection points in relation to the lips will give a more aesthetically pleasing result from the treatment.

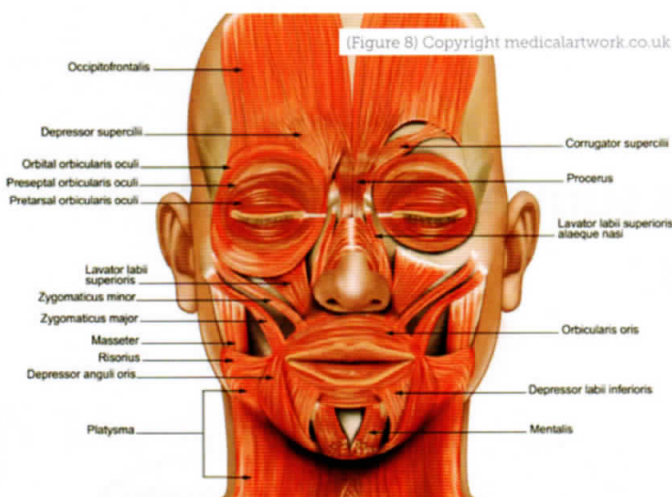
MUSCLES

Precise movement of the lips is essential for respiration, ingestion, phonation and facial expression. Thus, there are numerous muscles working together to produce the appropriate function. In order to describe the muscles acting on the lip, they have been divided below into three groups - Group I are muscles acting on the angle of the mouth at the modiolus, Group II attaching above the lip (elevators) and Group III acting on the lower lip (depressors).

Muscle Group I

The modiolus is the area at each commissure, which serves as an attachment for several of the muscles of the lower and upper lip. Within this group are the orbicularis oris, buccinator, levator anguli oris, depressor anguli oris, zygomaticus major and risorius muscles.

Orbicularis oris is a sphincter muscle, which causes the lips to purse and presses them against the teeth when contracted. Further muscle fibres of other muscles insert superficially in to orbicularis



(Figure 8) Copyright medicalartwork.co.uk

oris. In cross section orbicularis oris is seen as a long vertical segment that curls out at the superior and inferior margins. Motor movement is provided by the buccal and marginal mandibular nerves. In the upper lip the fibres of orbicularis oris are few, sparing the central region, this gives rise to the philtral column, which is devoid of dermal attachment, and thus this gives rise to a concave depression or cupid's bow.

Buccinator arises from the posterior alveolar process of the maxilla (Pterygomandibular raphe), a ligamentous band of the buccopharyngeal fascia and the body of the mandible it inserts into the modiolus. Its function is to press the cheek and lips against the teeth. Motor movement is supplied via the buccal branches of the facial nerve. The parotid duct joins the buccinator at the edge of the masseter muscle.

Levator anguli oris arises from the canine fossa of the maxilla beneath the infraorbital foramen and descends vertically and inserts in the modiolus with the function of elevating the oral commissure. The buccal and zygomatic branches of the facial nerve innervate this muscle and the facial artery and infraorbital nerve travel superficially on the surface of the muscle.

Depressor anguli oris (DAO) lies on the mandible below the canine and first premolar and inserts in to the modiolus. The marginal mandibular branch of the facial nerve supplies the DAO and enters the muscle deep. The DAO's function is to depress the oral commissure, this brings the smile line down, a feature often associated with negative perceptions.

Risorius arises in the fascia over the parotid gland and passes horizontally forward superficial to the platysma and inserts into the skin at the angle of the mouth, drawing the commissure laterally to help produce a pleasing smile. The buccal branch of the facial nerve enters the muscle deep. This muscle helps to produce the smile that is unique to human emotions.

Zygomaticus Major originates in the cheek area of the zygomatic arch just anterior to the zygomaticotemporal suture line, passing over the buccinator and inserting into the modiolus. Superiorly its fibres are deep and inferior and run superficially to the facial vessels and facial nerve. The zygomatic and buccal branches of the facial nerve supply zygomatic major and upon contraction, the corners of the mouth are lifted obliquely upwards and laterally, lifting in the corners of the mouth, resulting in a smile.

Muscle Group II

A further group of muscles insert in to the upper lip. These are levator labii superioris, levator labii superioris alaeque nasi (Otto's muscle) and zygomaticus minor.

Levator labii superioris is a quadrilateral muscle arising from the inferior orbital rim under orbicularis oculi and attached to the maxilla above the infraorbital foramen. Muscle fibres insert into the dermis of the upper lip skin and into the orbicularis oris muscle. The buccal branch of the facial nerve innervates this muscle and its action is to elevate the upper lip.

Levator labii superioris alaeque nasi, this muscle has the longest name of any muscle in the human body. It is sometimes referred to as 'Otto's muscle' after an anatomist who argued that its anatomical name was too long. It is not to be confused with levator labii superioris; this completely separate muscle arises from the frontal process of the maxilla. Its interior fibres insert on to the lateral alar cartilage and the dermis of the upper lip and orbicularis oris. Again nerve innervation is provided by the

STYLAGE®

(IPN)-Like TECHNOLOGY



The Natural Gentle Correction



STYLAGE® Lidocaine is the only patented range of cross-linked hyaluronic acid (IPN-Like technology) dermal fillers which incorporates both an anaesthetic (lidocaine) and an antioxidant (mannitol) for safe, comfortable and effective aesthetic treatments. It can be used for filling and smoothing of wrinkles, natural lip correction, volume restoration, hydration, chin remodelling, tear trough correction, neck, décolleté and hand rejuvenation. STYLAGE® is perfectly suited for use with a cannula. Launched in 2008, STYLAGE® by Laboratoires Vivacy (France) is now one of the world's fastest growing dermal fillers.

For further information about:

STYLAGE® Desirial® KARTILAGE®

Contact Medical Aesthetic Group
on 02380 676733
or visit www.magroup.co.uk

medical aesthetic group

buccal branch of the facial nerve and, upon contraction, levator labii superioris alaeque nasi dilates the nostril and elevates the upper lip into a snarl.

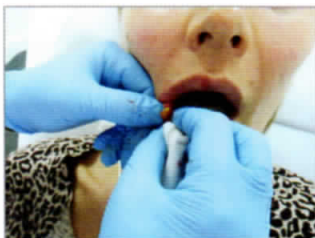
Zygomaticus Minor originates from the zygoma, seated below orbicularis oculi and laterally to the zygomaticomaxillary suture. Fibres pass downward and inferiorly insert into orbicularis oris. Innervation is supplied by the buccal branch of the facial nerve and blood supply via the labial branch of the facial artery. Upon contraction, zygomaticus minor elevates and pulls the commissure laterally, contributing to the smile but also the formation of the nasolabial fold.

Muscle Group III

Depressor Labii inferioris originates from the anterolateral mandible and medial to the insertion of the depressor anguli oris and lying deeper than the depressor anguli oris. Its fibres pass in a fan like distribution into the lower lip dermis and orbicularis oris muscle, depressing the lower lip and pulling it slightly laterally.

Mentalis, a paired central muscle of the lower lip, arises from the anterior midline of the mandible and inserts into the dermis. It pulls down on the margin of inferior orbicularis oris and everts the central portion of the lower lip. In conjunction with orbicularis oris contraction, the mentalis muscle allows the lips to 'pout'. Externally, mentalis contraction causes wrinkling of the chin skin (a dimpled chin), as used in expressions of doubt or displeasure.

Platysma is a broad thin sheet of paired muscle made up of fibrous bands arising from the fascia covering the upper part of the pectoral and deltoid muscles, passing upwards over the clavicle, the fibres proceed upwards and insert into the inferior border of the anterior mandible. The fibres cross superiorly just before reaching the edge of the mandible border and attach to the bone of the lower jaw and also have insertions into the skin



(Figure 9) Removal of granulomatous material lower lip unknown HA. Copyright Cosmedic Skin Clinic 2014



(Figure 10) Removal of granulomatous material lower lip unknown HA. Copyright Cosmedic Skin Clinic 2014

and subcutaneous tissue of the lower face. Many of the fibres of platysma blend with muscle fibres of neighbouring muscles around the angle of the mouth and lower face. The cranial branch of the facial nerve provides innervation and predominant blood supply via the submental branch of the facial artery.^{6,7,8}

TREATMENT TECHNIQUE AND MINIMISING RISK

Starting with the vermillion border, and working from lateral to medial, slowly inject the filler (retrograde technique) and aspirate, or draw back, prior to injection to minimise the risk of intra-vascular injection. Volume can be created by injecting into the wet/dry border at mid-depth. Complications or unwanted side effects can occur with the injection of any dermal filler no less so than when injecting the lips, hence the importance of seeking training in this specific technique from an experienced trainer. The first step to avoiding complications is to ensure an appropriate product for the indication is used. Adverse events, however, can still

occur and may be immediate or delayed in onset. Complications might include injection site reactions, infection, sensitivity and allergy, bruising and trauma from poor injection technique. After a thorough consultation and medical history the practitioner should consider herpes prophylaxis if indicated before treating with dermal fillers (Aciclovir 200mg 5 times a day for 5 days).⁹ There is no evidence-based data to support the belief that fillers play a triggering role in recurrent herpes infection and thus there is no rationale in using an antiherpes prophylaxis regimen with every patient. However, patients who have had an history of developing cold sores after a filler injection may benefit from it.¹⁰ Filler injections should not be performed if there is an adjacent site of infection e.g. intraoral, mucosal or dental infection or herpes labialis for lip injections. Stopping anti inflammatory drugs and refraining from alcohol for two to three days prior to injection can help to minimise the risk of bruising. Practitioners should discuss with the patient the treatment fully including expected results and potential complications. Any pre-existing asymmetry or skin conditions should be highlighted and of course good pre- and post-treatment photographs are essential.

Products which are placed too superficially may result in nodules or the presence of a bluish tinge known as the Tyndall phenomenon. This can also be a result of hemosiderin caused by intradermal bleeding.¹¹ Nodules formed of hyaluronic acid (HA) in the lip can sometimes be punctured and their contents expressed. (Figures 9 and 10) Consider injections at the lip angles to offer extra support and injection of the philtral column if needed for optimum aesthetic results.

CONCLUSION

When treating the lips and perioral region it is important to create and maintain an overall plan. Understanding the anatomy of the region as well as taking into consideration the age, gender and ethnicity of the patient will ultimately give a more favourable and aesthetically pleasing result. Assessment using well-defined scales is helpful and taking into account additional factors such as volume and movement will create a more natural appearance.



Sharon King RM, NIP is a director and clinical nurse specialist at Cosmedic Skin Clinic, board member of The British Association of Cosmetic Nurses, member of the Aesthetic Complications Expert Group and Aesthetic Nurse Practitioner of the Year (Aesthetics Awards 2013-14). She has worked as a clinical trainer for some of the leading suppliers to the aesthetics industry during her 10 years in aesthetic practice.

REFERENCES

- Chisholm BB, 'Facial implants: Facial augmentation and volume restoration,' *Oral & Maxillofacial Surgery Clinics of North America*, 17(1), (2005), pp.77-84.
- Goodman, G Duckless, 'Lips: How to Rejuvenate the Older Lip Naturally and Appropriately' *Cosmetic Dermatology*, Vol 25 No 6 (June 2012)
- Swift A, Remington K, 'BeautiPHication: a global approach to facial beauty,' *Clinical Plastic Surgery*, 38 (2011), pp. 347-377
- Naidu D, 'Comparisons of the Consistency and Sensitivity of Five Reference Lines of the Horizontal Position of the Upper and Lower Lip to Lateral Facial Harmony' *The Orthodontic Cyber Journal*, (2010) <http://orthodj.com/2010/11/comparisons-of-the-consistency-and-sensitivity-of-five-reference-lines-of-the-horizontal-position-of-the-upper-and-lower-lip-to-lateral-facial-harmony/>
- Hoefflin SM, *The beautiful face: The First Mathematical Definition, Classification and Creation of True Facial Beauty* (California, Steven M. Hoefflin, M.D, 2002)
- Nelson DW, Gingrass RP, *Anatomy of the mandibular branches of the facial nerve,' Plastic Reconstructive Surgery*, 64(4), (1979), pp.479-82
- Gray H, *Grays Anatomy The Classical Collector's Edition*, (Crown Publishing, 1977)
- Pinar Y A, Bilge, O, Govsa F, 'Anatomic study of the blood supply of perioral region,' *Clin Anat*, 18(5), (Jul 2005), pp.330-9
- British National Formulary (BMJ Group London, 2013)
- Duffy DM, 'Complications of fillers: Overview' *Dermatol Surg*, 31 (2005), pp. 1626-33
- Bergeret-Galley C, Latouche X, Ilouz YG, 'The value of a new filler material in corrective and cosmetic surgery: Dermalive and Dermalive,' *Aesthetic Plast Surg*, 25 (2001), pp. 249-55