NEW Regular Feature

Treatment of mid face expression rhytides:

a new injection protocol for treatment of the mid face.

Warren Roberts, DMD and Janet Roberts, BSc, DMD

Abstract:

Botulinum toxin type A (BoNTA) is now used extensively for rejuvenation of the Glabella, Frontalis, lateral Orbicularis Oculi, lower face and neck. Although there are numerous articles documenting the use of botulinum toxin in the treatment of LLSAN and 'Gummy Smiles", the current literature is scarce with respect to the middle of the face. The lack of exploration of treatment in this area of the face may be due to the migration of the toxin into muscles that may cause a ptosis and or inability to raise the upper lip and smile. This paper describes a new injection template and injection technique using BoNTA: Allergan, Irvine, CA, USA, to diminish the wrinkles of the middle of the face. Our experience in treatment of over 500 patients is described. Use of the Roberts Facial Rejuvenation Photography series, with specificity of dose and injection technique results in extremely high patient satisfaction and no negative side effects. The Mid Face Expression Technique is effective, minimally invasive and an alternative to dermal fillers and surgery.

Non-surgical facial rejuvenation procedures for the mid third of the face frequently comprise dermal fillers and laser treatments. This article presents an adjunctive treatment for this area utilizing botulinum toxin type A.

At the Pacific Training Institute for Facial Aesthetics (PTIFA) we coined the term "mid-face expression" (MFE) to describe one of the natural expressions of the mid-face frequently used in conversation and animation. This expression is observed when the patient consciously or sub-consciously "scrunches" up the middle of their face using muscles of facial expression innervated by the seventh cranial nerve (Fig. 1a-b). A variety of muscles are recruited to create an individual's unique mid-face expression including: Zygomatic major, Zygomatic minor, Levator Anguli Oris, Levator labii superioris, Levator Labii Superioris Alaeque

Fig. 1a: Mid Face Frontal Relaxed showing initial static lines

Fig. 1b: Mid Face Frontal Expression with vert. peri-oral lines, horiz. supra-maxillary lip lines, infra-orbital & nasal lines

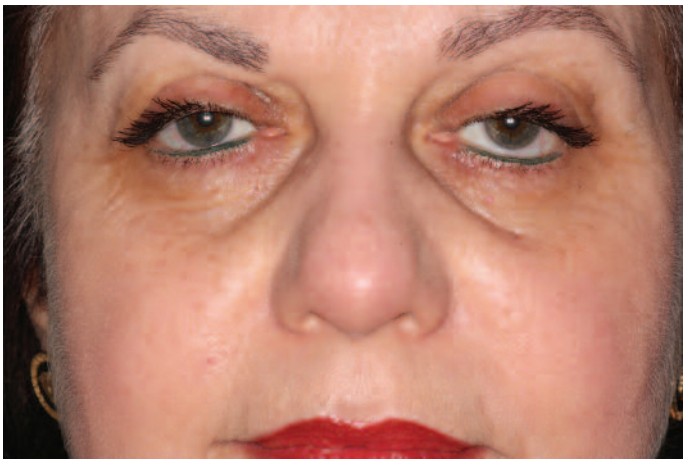

Fig. 2a: Mid Face Frontal Relaxed with Mediterranean skin tone

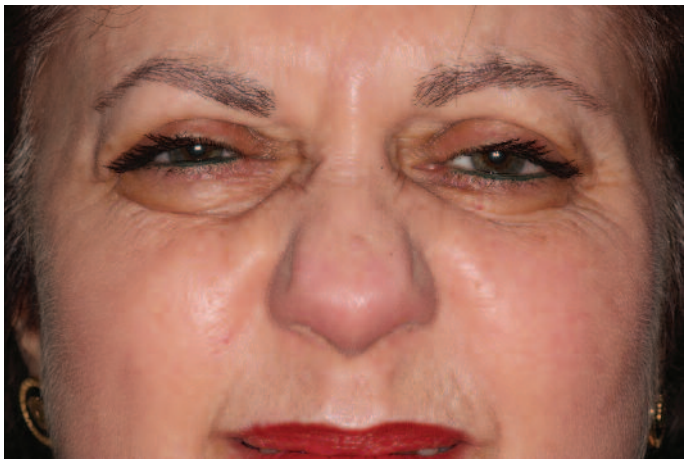

Fig. 2b: Mid Face Frontal Expression demonstrating shadowing of the infra-orbital area with Mediterranean skin tones

Nasi (LLSAN), Nasalis, and to a lesser extent Procerus & Orbicularis Oculi. These levator muscles of the mid- face with their associated manifold movements, create a combination of habitual expressions that can cause negative sequelae on the over-lying skin including vertical peri-oral lines (smoker's lines), horizontal supra- maxillary lip lines, angulated lines on the lateral surface of the nose, bunny lines along the side of the nose, horizontal infra-orbital lines, exaggeration of the nasiolabial fold, exaggeration of the infra-orbital ring and also the so-called "gummy smile".

The mannerisms associated with activation of the mid-face expression are learned at an early age. The learned habit can be regional in nature. As the habit endures over time, epithelial memory results in greater creasing of the affected tissue. Many of the muscle actions result in lines of the mid-face, producing undesirable shadowing on the surrounding tissue; this shadowing is often accentuated by darker skin tones (Fig. 2a-b).

These mid-face expressions occur quickly and the patient is often unaware of performing them. Previously, medial lines around the nose ("bunny lines") have been attributed solely to contractions of Nasalis and lateral lines around the eyes ("crow's feet") to Orbicularis Oculi. Until recently, a method for accurately recording and assessing these static and dynamic lines has been lacking.

The Roberts Facial Rejuvenation Photography (RFRP) series [1] comprises 29 facial photographs with the muscles in repose and activation (Fig. 3a-d). The series is an accurate tool for diagnosing the muscular origins of facial lines and wrinkles and has also proven invaluable as a patient education and communication tool (Fig. 3e).

To obtain accurate results when using botulinum toxin, it is imperative to treat muscles, not simply wrinkles or folds. By analyzing the RFRP series and armed with proper anatomical knowledge it is possible to determine precisely which muscles are responsible for the wrinkling or folding of the skin. Viewing both the RFRP series and the patient actively performing the MFE "scrunch" (Fig. 1b), it is possible to differentiate which muscle or combination of muscles is causing the unwanted lines. Often the primary muscle group

Fig. 3a: RFRP - Full Face 10 photos

Fig. 3b: RFRP - Clos up Face 6 photos

involved is surprisingly distant to the line in question. The MFE action frequently causes lines lower in the face, specifically peri-oral lines. Some facial expressions overlap less used expressions. With the RFRP series recording the various expressions, it is possible to determine the dominant repetitive expression responsible for the lines and specifically which of the closely related muscle(s) is responsible. Armed with this knowledge, botulinum toxin can accurately be placed to relax the targeted muscle(s) without negative side effects. This MFE procedure is not for an inexperienced practitioner, as one needs the ability to precisely locate the specific muscle(s) responsible and the skill to inject, at times, very small amounts of botulinum toxin (sometimes just 0.5u to 1.0u). The use of the PTIFA wheal injection technique with only .5mm penetration is critical in the mid face to prevent bruising and maintain the toxin on the target muscle.

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Fig. 3c: RFRP - Upper Face & Crow's Feet 8 photos

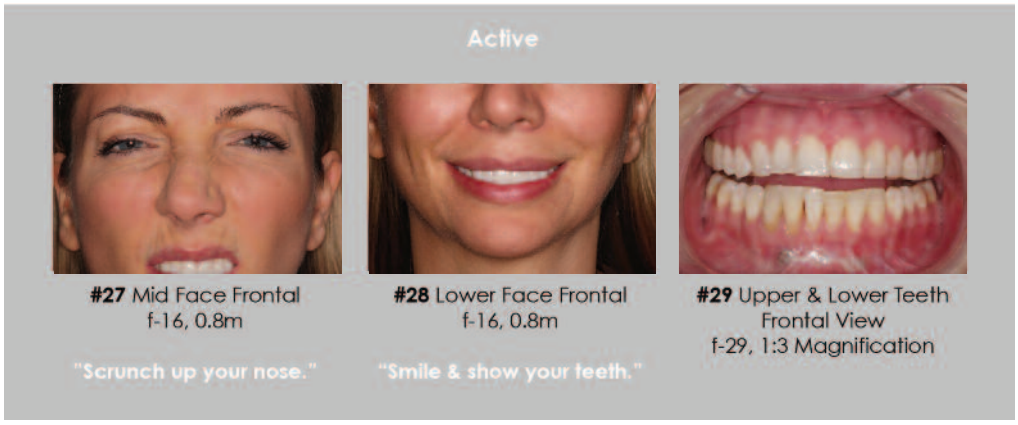

Fig. 3d: RFRP - Mid-face, Lower Face, Intra-oral 5 photos

Vertical Peri-oral lines

Peri-oral lines are commonly referred to as "smoker's lines" although many patients presenting with smoker's lines have never smoked. These lines are often treated by injecting botulinum toxin around the mouth just outside the vermillion border of the lips targeting the Orbicularis Oris muscle. A pleasant treatment result can be obtained with this technique. However, this injection technique often results in some loss of sensation and decreased ability to purse the lips. Most patients can tolerate this side effect if the injections are carefully balanced between the left and right sides and both the upper and lower lips. However, some patients such as those who play wind instruments or who are singers, do not tolerate this technique well. Some patients also report that it causes them to inadvertently bite the inside of their lips.

An alternative approach targeting the MFE allows relaxation of the muscles in the

Fig. 3e: Patient viewing the RFRP series On the monitor & highlighting on their own photograph areas of concern

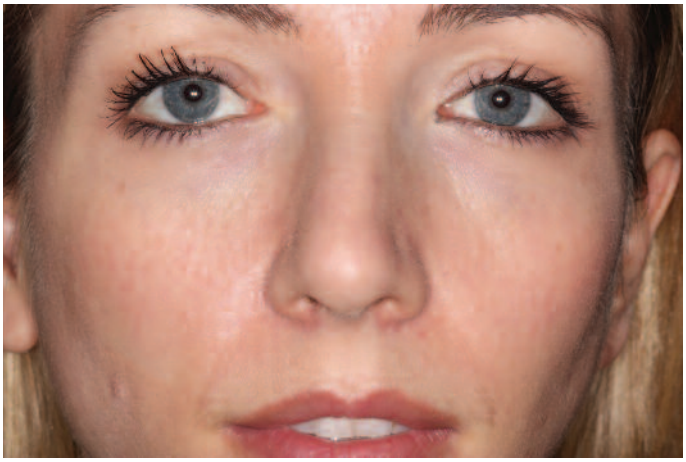

Fig. 4a: Mid Face Frontal Relaxed with no satatic lines

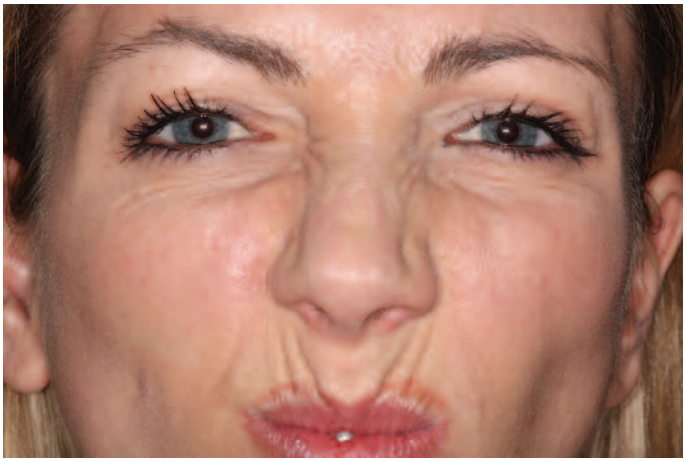

Fig. 4b: Mid Face Frontal Expression demonstrating verticle peri-oral lines

Fig. 4c: Upper & Mid Face Relaxed with markings pre Botox

Fig. 4d: Upper & Mid Face Expression with markings pre Botox

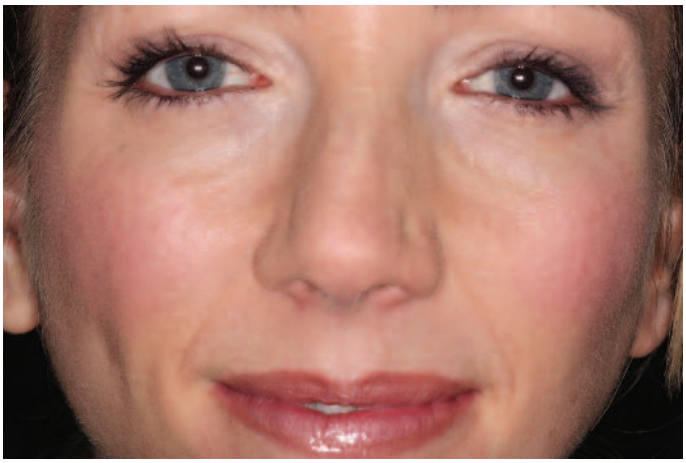

Fig. 4e: Mid Face Frontal Expression 2 weeks post Botox with no peri-oral lines

mid-face that are directly responsible for the peri-oral lines and negates the aforementioned side effects. Observe the patient performing the MFE "scrunch" and the maxillary vertical peri-oral lines are easily observed (Fig. 1b). Often this expression is used unknowingly during animated conversation. The patient may initially need assistance to perform the expression on command. A mirror may be a useful aid. After observing the MFE "scrunch" ask the patient to purse their lips like they are kissing someone through a chain link fence. Often this action will duplicate the mid face scrunch lines----but to a lesser degree. As you have an animated discussion with the patient, you will notice that they may frequently perform a MFE "scrunch" unknowingly. The muscles usually involved are the Levator Labii Superioris Alaeque Nasii group (LLSAN), Levator Superioris and to a lesser extent Levator Anguli Oris. It is necessary to determine the major muscle(s) causing these perioral lines. In the following example (Fig. 4a-e), placing botulinum toxin in the mid-face area in LLSAN (both the main body and the alar branch) will minimize its contraction and reduce the expression creating the smoker's lines (Fig. 4e). The younger the patient, the more easily the vertical lines are softened. More mature patients with deeper lines will have a less dramatic result and may require adjunctive dermal abrasion or laser treatment (Fig. 5a-b). Treatment of this area can be used preventatively or interceptively in patients exhibiting strong mid-face activity to prevent "having smoker's lines like

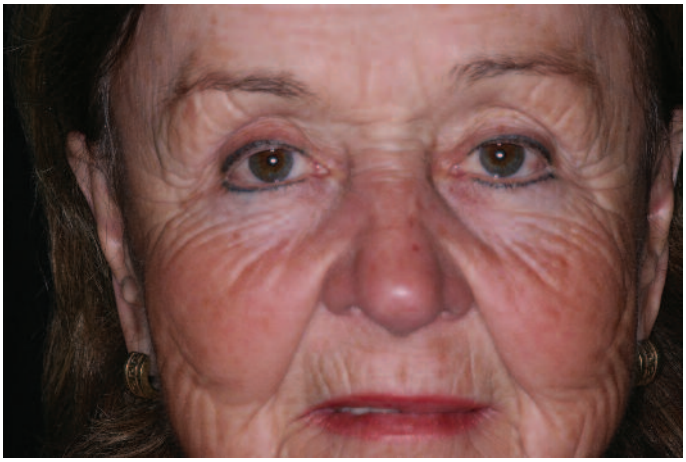

Fig. 5a: Mid Face Frontal Relaxed more mature patient with static lines

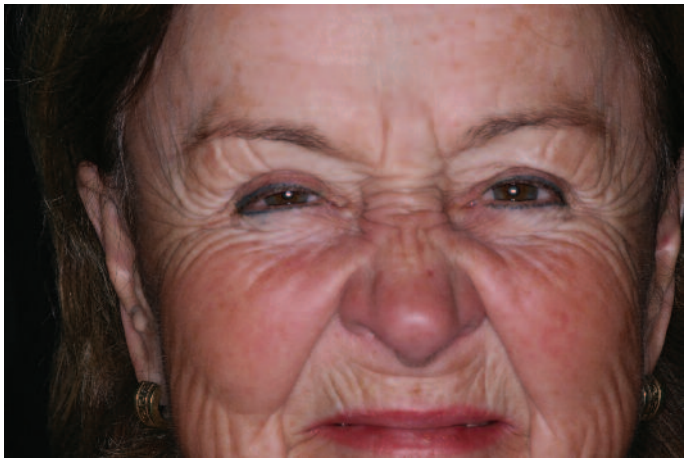

Fig. 5b: Mid Face Frontal Expression more mature patient with heavy peri-oral lines

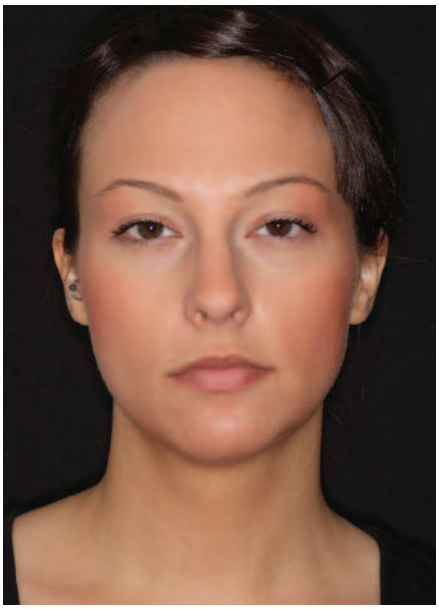

Fig. 6a: Full Face Frontal Relaxed with no static lines

Fig. 6b: Full Face Right Sagital Relaxed with no static lines

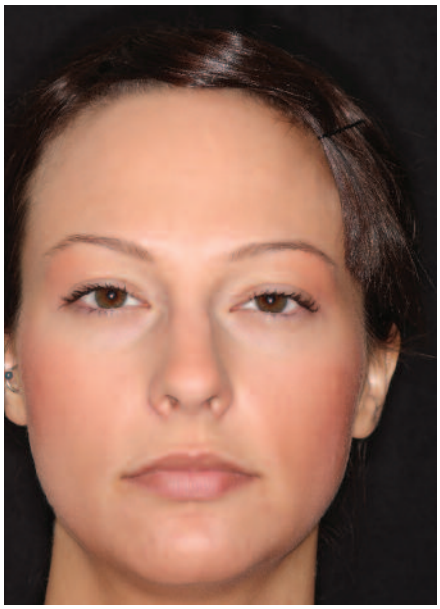

Fig. 6c: Close up Face Frontal Relaxed with no static lines

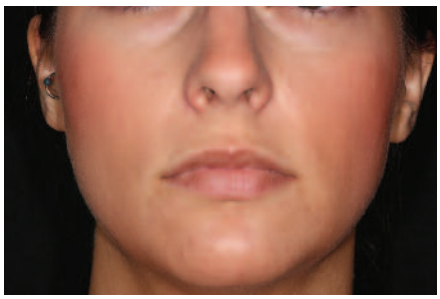

Fig. 6d: Lower Face Frontal Relaxed with no static lines

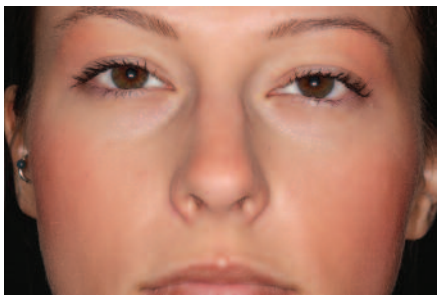

Fig. 6e: Mid Face Frontal Relaxed with no supra maxillary lip lines

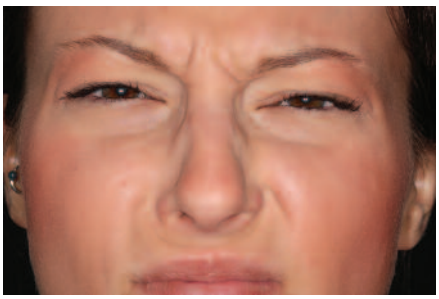

Fig. 6f: Full Face Frontal Relaxed with no static lines

my mother has". An additional benefit often associated with these injections is softened horizontal infra-orbital lines (discussed below).

Horizontal Supra-Maxillary Lip lines

Horizontal supra-maxillary lines often present in unison with vertical peri-oral lines and also appear alone (Fig. 6a-f). These

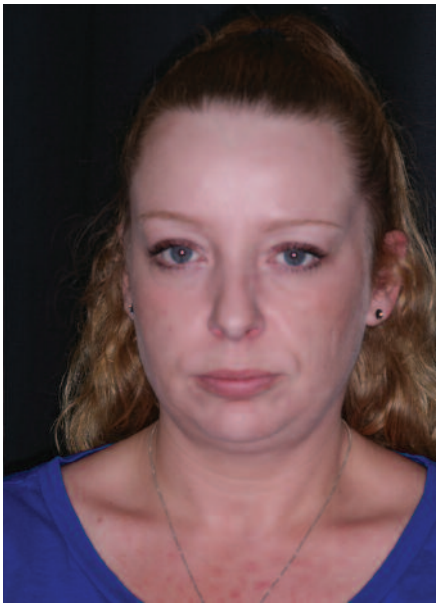

Fig. 7a: Full Face Frontal Relaxed with Skeletal class II

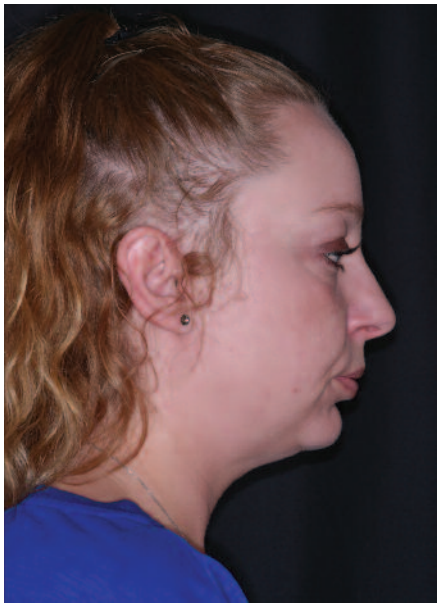

Fig. 7b: Full Face Right Sagital Relaxed with skeletal class II

horizontal lines may appear in photographs and make an individual very self-conscious. There can be a compound effect when there is a Class II skeletal relationship between the maxilla and the mandible with associated deep overbite (Fig. 7a-i). A deep horizontal line below the lip (mental crease) is usually also present (Fig. 7a,b,g,h). These two horizontal lines in the lower face (one above and one below the lips) are visible (Fig. 7i).

The RFRP series is invaluable in assessing these horizontal supra-maxillary lip lines. It also allows observation and recording of the upper lip position and its relationship to the amount of maxillary anterior tooth display. Care must be taken during

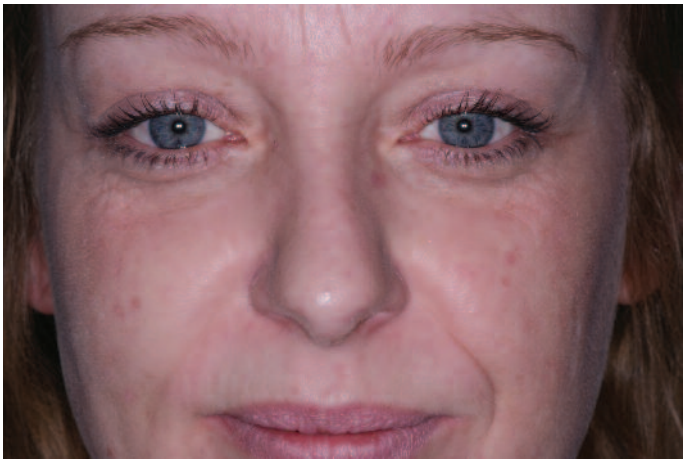

Fig. 7c: Mid Face Frontal Relaxed with minimal static lines

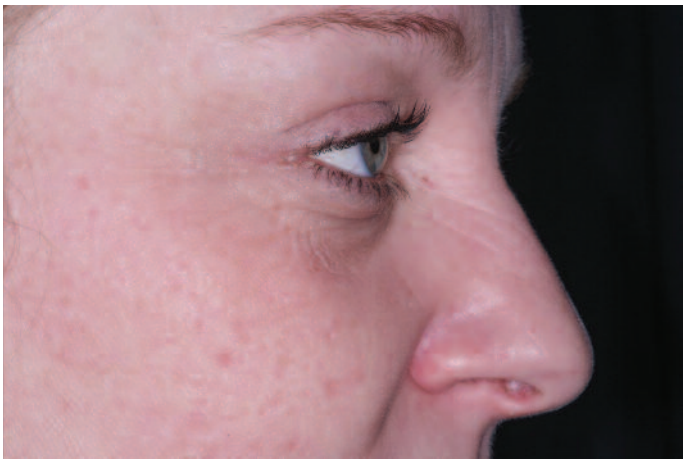

Fig. 7d: Mid Face Right 90' Relaxed with minimal static lines

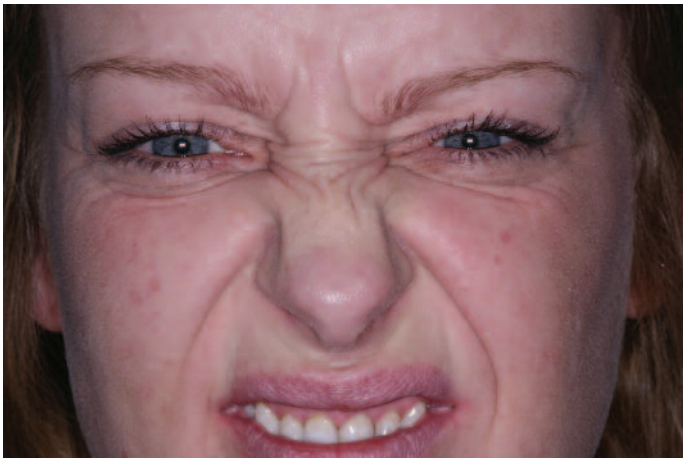

Fig. 7e: Mid Face Frontal Expression with supra maxillary horizontal lip lines

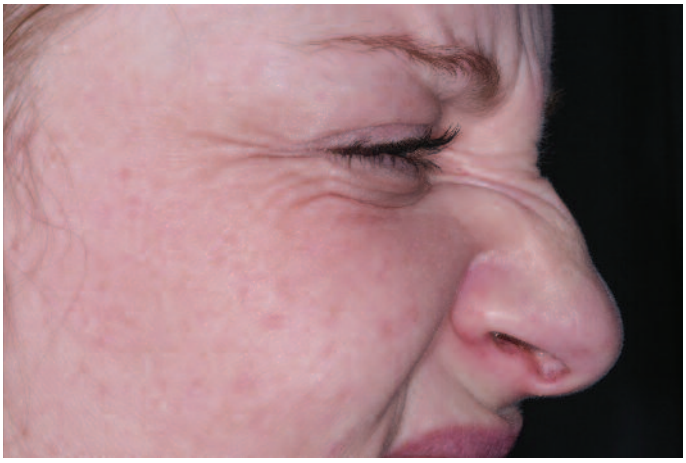

Fig. 7f: Full Face Frontal with vertical & horizontal lip lines

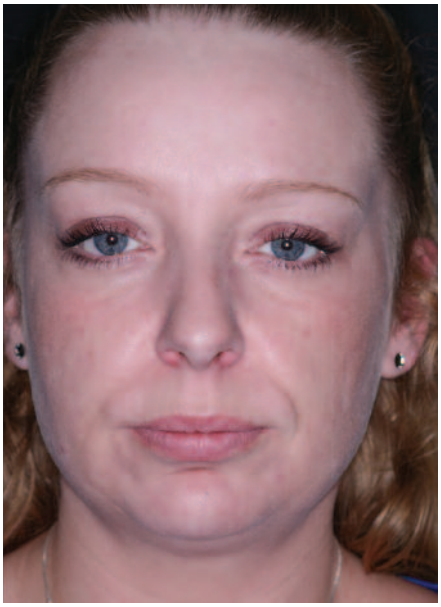

Fig. 7g: Close up Face Frontal Relaxed with Skeletal Class II

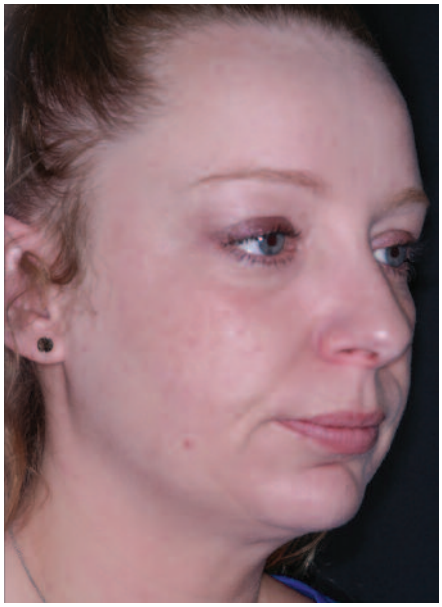

Fig. 7h: Full Face Right 45' Relaxed with skeletal class II

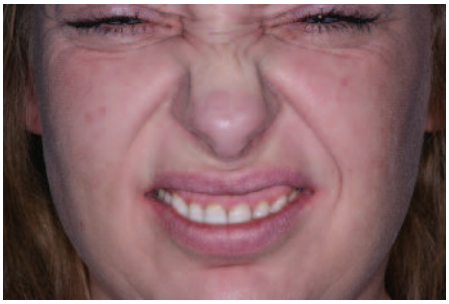

Fig. 7i: Lower Face Frontal Expression with skeletal class II, MFE acitive supra-maxillary & infra-mandibular horizontal lip lines.

peri-oral lines. Small doses of 1u botulinum toxin in selected sites are often all that is required. Slightly higher doses may be needed with more mature patients and stronger muscle activity.

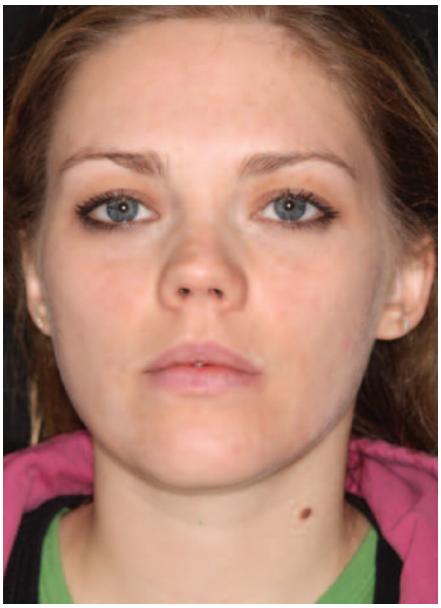

Fig. 8a: Full Face Frontal Relaxed pre Botox - first appointment

Fig. 8b: Full Face 45' Right Relaxed pre Botox -first appointment

Fig. 8c: Full Face 45' Left Relaxed pre Botox - first appointment

treatment not to lower the upper lip, decreasing maxillary tooth exposure and causing a more aged appearance. The more mature patient is at greater risk as the lip has already lengthened and covering more of the maxillary incisors [2]. It should also be determined if the patient is considering a dental smile makeover as the amount of anterior tooth display is critical in smile design [3][4].

Individuals have a unique levator pull on the supra maxillary lip area resulting in these horizontal lines above the lip.

Treatment of these horizontal supra-maxillary lines follows the same injection pattern in the mid-face as used for vertical

Gummy Smile

A "gummy smile" is defined as display of more than 2mm of gingival or muco-gingival soft tissue above the maxillary anterior tooth zenith. Gummy smile occurs in 13.8% of young females and 6.8% of young males [5] and is generally regarded as unattractive. The differential diagnosis includes short maxillary lip [6][7], maxillary / mandibular skeletal relationship [8], altered passive tooth eruption [9][10]or simply a hyper-mobile upper lip [11].

Subsequent to the diagnosis, treatment of this condition

Fig. 8d: Full Face Frontal High Smile with gingival display-pre Botox-first appointment

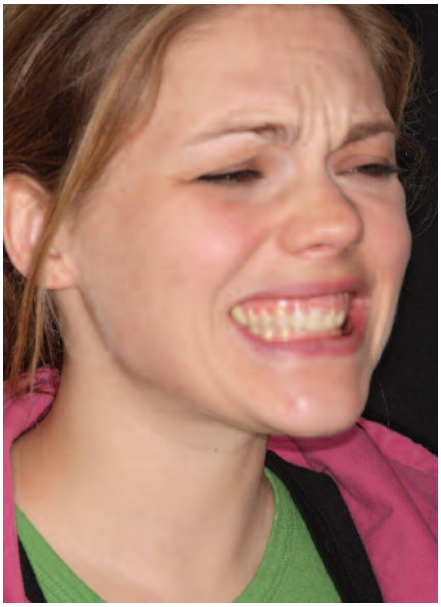

Fig. 8e: Full Face 45` Right High Smile with gingival display -pre Botox-first appointment

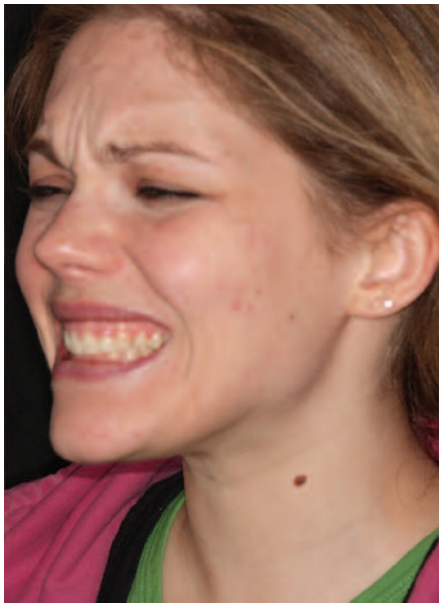

Fig. 8f: Full Face 45` Left High Smile with gingival display -pre Botox -first appointment

Fig. 8g: Full Face Frontal Relaxed 5 months post Botox treatment with normal relaxed contour

Fig. 8h: Full Face 45` Right Relaxed 5 months post Botox treatment with normal relaxed contour

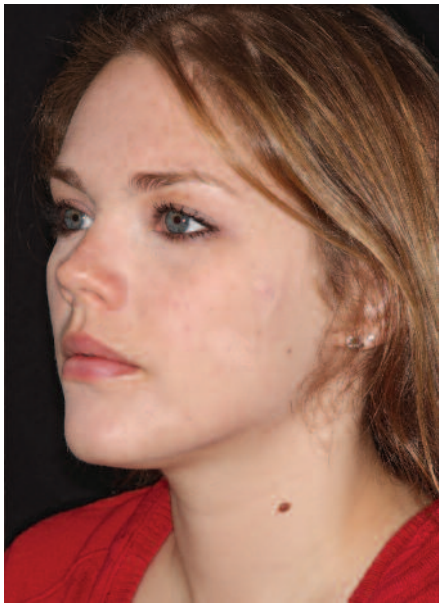

Fig. 8i: Full Face 45` Left Relaxed 5 months post Botox treatment with normal contour

may be comprised of a combination of intrusion orthodontics, hard and/or soft tissue surgery. A simple, relatively inexpensive and non-invasive alternative for patients unwilling or unable to undergo surgery utilizes careful placement of botulinum toxin in the lower part of LLSAN near the ala of the nose. This solution is best suited for younger patients with no other MFE lines (Fig. 8a-l). As the maxillary lip lengthens with age, there will be less 'gummy smile' and thus the use of botulinum toxin may not be required in middle age. In the aging process, the relaxed lip line drifts inferiorly [9]. In the more mature adult with gingival display while smiling, a low LLSAN injection is contraindicated, as this would relax the levator muscles and completely cover the maxillary incisors. One does not wish to further 'drop the lip' line at rest. A higher LLSAN would be indicated. However, one must review the RFRP series and the patient's expressions to determine what other muscle recruitment is occurring and what other lines are presenting with the more mature facial expression.

Infra-orbital Lines

Lateral peri-orbital rhytides fanning out laterally from the eye are commonly known as "crow's feet. Proper placement of

Fig. 8j: Full Face Frontal High Smile 5 months post Botox treatment Demonstrating normal gingival display

Fig. 8k: Full Face 45` Right High Smile 5 months post Botox treatment Demonstrating normal gingival display

Fig. 8l: Full Face 45` Left High smile 5 months post Botox treatment Demonstrating normal gingival display

Fig. 9a: Full Face Frontal Relaxed pre Botox-first appointment

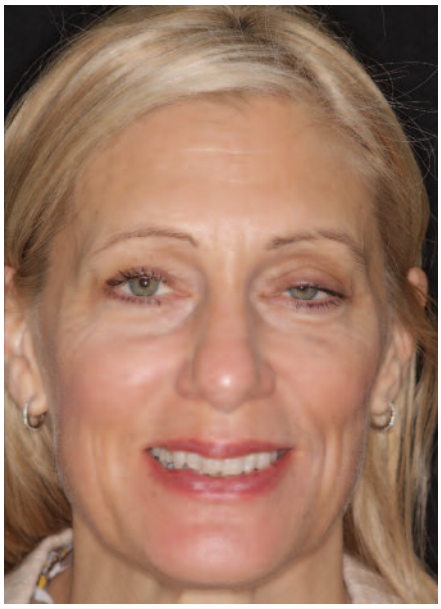

Fig. 9b: Close up Face Frontal Smile pre Botox-first appointment

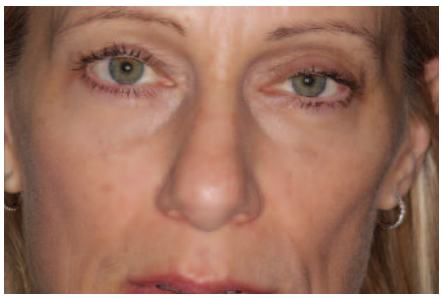

Fig. 9c: Mid Face Frontal Relaxed pre Botox first appointmen with initial infrra-orbital static lines

botulinum toxin can diminish these rhytides. However, there are commonly some infra-orbital lines that do not disappear, or they reoccur more quickly than the more lateral lines caused by Orbicularis Occuli. In an attempt to treat these lines, it is tempting to increase dosage and / or follow the

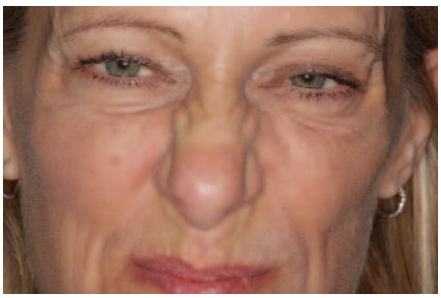

Fig. 9d: Mid Face Frontal Expression pre Botox first appointment with infra-orbital lines

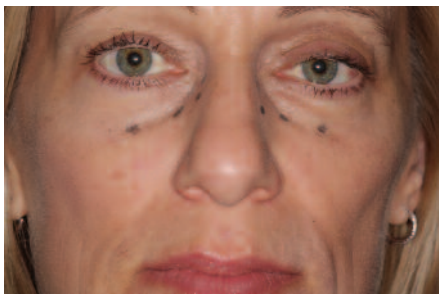

Fig. 9e: Mid Face Frontal Relaxed pre Botox first appointment with markings

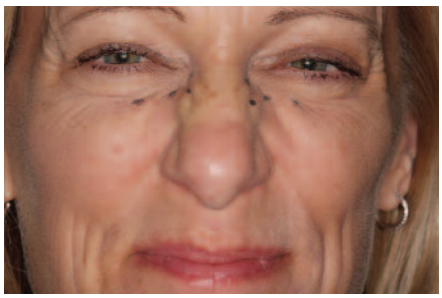

Fig. 9f: Mid Face Frontal Expression pre Botox first appointment with markings & infra-orbital lines

Fig. 9g: Full Face Frontal Relaxed post Botox

Fig. 9h: Full Face Frontal Smile post Botox

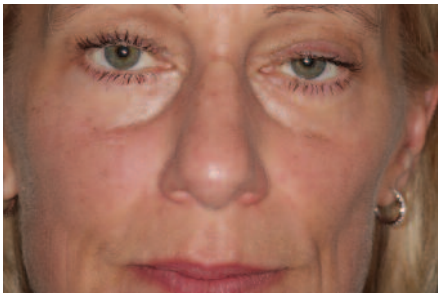

Fig. 9i: Mid Face Frontal Relaxed post Botox

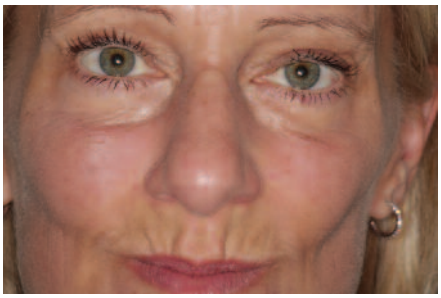

Fig. 9j: Mid Face Frontal Expression post Botox with no infra-orbital lines

rhytides inferiorly. Chasing these lines inferiorly can cause inadvertent injection of Zygomatic Major & Minor with disastrous consequences. The resultant inability to raise the lateral portion of the mouth causes the appearance of unilateral facial paralysis (albeit temporary).

Careful review of the MFE in the frontal, sagittal and 45°views of the RFRF series, will reveal that these inferior rhytides and the infra-orbital line are actually originating from the MFE and its associated muscles, not simply Orbicularis Oculi (Fig. 9a-j). Since the infra-orbital line is a horizontal line, it is being produced by the contraction of vertical muscles. The vertical muscles normally involved are the Levator Labii Superioris and Levator Anguli Oris and in some individuals even Zygomatic Minor. Injection into these muscles at their origin on the infra-orbital prominence of the maxillary bone will weaken their vertical contraction and soften the associated horizontal line (Fig. 9j). Again care must be taken and observation of the smile line is a critical factor.

Conclusion: Use of botulinum toxin in the mid face can have beneficial aesthetic outcomes. The inclusion of botulinum toxin type A into the treatment of MFE can have beneficial compound effects with laser treatment. The use of dermal fillers can be diminished and the relaxing of the musculature allows placement of dermal fillers without the drift and bunching up of the hyaluronic acid as commonly observed. ■

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Dr. Warren Roberts is the Clinical Director for the Pacific Training Institute for Facial Aesthetics (PTIFA) and is a leading Botox educator whose Vancouver clinic is the #1 administrator of Botox across North America dental practices. He is the developer of the Roberts Facial Rejuvenation Photography series, the PTIFA Cosmetic & Therapeutic Marking Templates, the PTIFA injection technique and established the first online Botox Study Club. He can be reached at drwarren@ptifa.com or 1-855-681-0066.

Dr. Jan Roberts is the Senior Clinical Instructor for PTIFA and is also a Clinical Director for the Frontier Institute. She is in the final stages of her AACD accreditation - the world's most recognized advanced credential program. Currently, she is the leading voice on how the combination of cosmetic dentistry and facial rejuvenation treatments can work together to push patient satisfaction to the next level. Through her work with PTIFA and Dr. Warren Roberts – she is creating a new understanding of how doctors can achieve better outcomes in therapeutic and cosmetic cases with the two disciplines working together. She can be reached at drjan@asmileabove.ca or 1-855-681-0066