
Social Implications of Hyperfunctional Facial Lines

J. CHARLES FINN, MD,*[†] SUE ELLEN COX, MD,*[‡] MELISSA L. EARL, MPH[§]

**Aesthetic Solutions of North Carolina*, [†]*Department of Surgery, Duke University*, [‡]*Department of Dermatology, University of North Carolina, Durham, North Carolina*, and [§]*Innovative Medical Solutions, Riverside, California*

The face is the focus of human interactions, and facial appearance profoundly affects self-esteem. Facial appearance is not only a compilation of the dimensions of the primary morphologic features but is also a direct result of the emotional expressions exhibited on the face. Facial expressions are central in the communication of emotions, as well as in signaling characteristics such as age. The repeated expression of emotions produces hyperfunctional facial lines, and the presence of these

lines when the face is at repose may give an erroneous impression of emotions or personality characteristics. These lines are also perceived as a sign of aging. Treatment of hyperfunctional facial lines is beneficial for patients who believe that their faces are not communicating their emotions properly, who want to delay the outward appearance of aging, or who simply want to look their best.

MELISSA EARL WAS COMPENSATED FOR TIME SPENT DEVELOPING THE ARTICLE. CHARLIE FINN AND SUE ELLEN COX ARE CONSULTANTS FOR ALLERGAN.

A LARGE body of research has documented that in our society, physical appearance has a large impact on how individuals are perceived by others.¹⁻⁴ Individuals perceived to be attractive receive preferential treatment in education, employment, medical care, legal proceedings, and romantic encounters that often result in their being happier, more successful, more socially adept, and more sexually fulfilled than others.² Studies have shown that individuals who are above average in attractiveness earn more money than those with an average appearance, and individuals with below-average looks are penalized with the lowest hourly wages.³ Furthermore, physical appearance is intrinsically linked to body image, self-esteem, and confidence, and an attractive appearance promotes psychological well-being.⁵

Who or what defines beauty? Why do we perceive some features as universally beautiful? Nancy Etcoff in *Survival of the Prettiest*⁴ eloquently discusses this topic in detail. There are many customs, adornments, and fashions that vary widely between cultures. Often these features signify rank, wealth, or status. However, there are several features that are regarded as beautiful in all cultures. Clear skin may connote a healthy, clean, parasite-free body. In females, a waist to hip ratio of 0.6 implies fertility and well-nourished bodies. Similarly, facial symmetry is a universal feature deemed attractive, even to neonates. Clearly, some standards of

physical attractiveness are “hard wired” into our brains; thus, beauty is not merely defined by popular culture.

The external signs of aging vary widely among individuals. Major determinates of facial aging include genetics, smoking, sun exposure, and muscle activity. With facial aging, permanent features of the face (such as soft tissue and bony structures) show gradual change over time. Bone will atrophy and alter the support provided to overlying soft tissues. Facial fat will redistribute and sag. As skin ages and the support of the underlying structures is lost, more wrinkles and folds will develop. Smoking and solar radiation contribute to the loss of skin elasticity and accelerate wrinkle formation. The orientation and depth of these folds and lines are greatly influenced by underlying muscle activity. Both the fixed structures and the slowly changing structures together contribute to the physical features of the individual.⁶ These facial features, along with those that rapidly and visibly change in appearance during facial expressions, signal many characteristics of the individual, including health, emotion, and age.⁷

The face is the focus of human communication and is thus central to social interaction and the perception of attractiveness. Facial expressions have evolved in our species as a way to communicate nonverbally as well as a way to enhance verbal communication.⁷ However, with aging, some facial lines gradually change from dynamic lines communicating emotion to static lines ingrained on the face at rest. For some individuals, these static facial lines may adversely affect communication, attractiveness, and potentially self-esteem.

Address correspondence and reprint requests to: J. Charles Finn, MD, Aesthetic Solutions, 5821 Farrington Rd, Suite 101, Chapel Hill, NC 27517

Etiology and Location of Hyperfunctional Facial Lines

Contraction of facial muscles causes facial movement and also creates transient wrinkles and furrows perpendicular to the direction of muscle contraction. When facial lines form only with muscle contraction, they are called dynamic facial lines. Frequent formation of dynamic facial lines can lead to the creation of facial lines even without muscle contraction, or static facial lines. Static facial lines and undesired dynamic facial lines, occurring more frequently or more intensely than needed for expression, are called hyperfunctional facial lines. These lines often transmit facial miscues and increase perception of age or undesirable emotional experience (Figures 1 and 2).

Hyperfunctional lines are common in the forehead, between the brows, around the eyes, and in the area of the mouth. Horizontal lines in the forehead are caused by the contraction of the frontalis muscle. Frontalis contraction can be used functionally to raise a ptotic

brow or eyelid to improve the visual field. Frontalis contraction may also be an emotional response signaling surprise or interest. Hyperfunctional forehead lines may give an impression of aging. During frowning, contraction of the corrugator and the orbicularis causes deep vertical creases in the glabellar region. Horizontal lines at the root of the nose are caused by contraction of the procerus and depressor supercilli. The presence of these hyperkinetic frown lines in the face at repose can give an impression of anger or dissatisfaction. Crow's feet radiating from the lateral canthus are caused by contraction of the lateral fibers of the orbicularis oculi and can become static with aging. Perioral lines caused by contraction of the orbicularis oris sphincter of the mouth are also associated with aging and with smoking. Contraction of the depressor anguli oris can cause lines that radiate downward from the corners of the mouth (marionette lines or melomental folds) and can pull down the corners of the mouth in a perpetual frown. These also give an impression of sadness and aging (Figure 3).

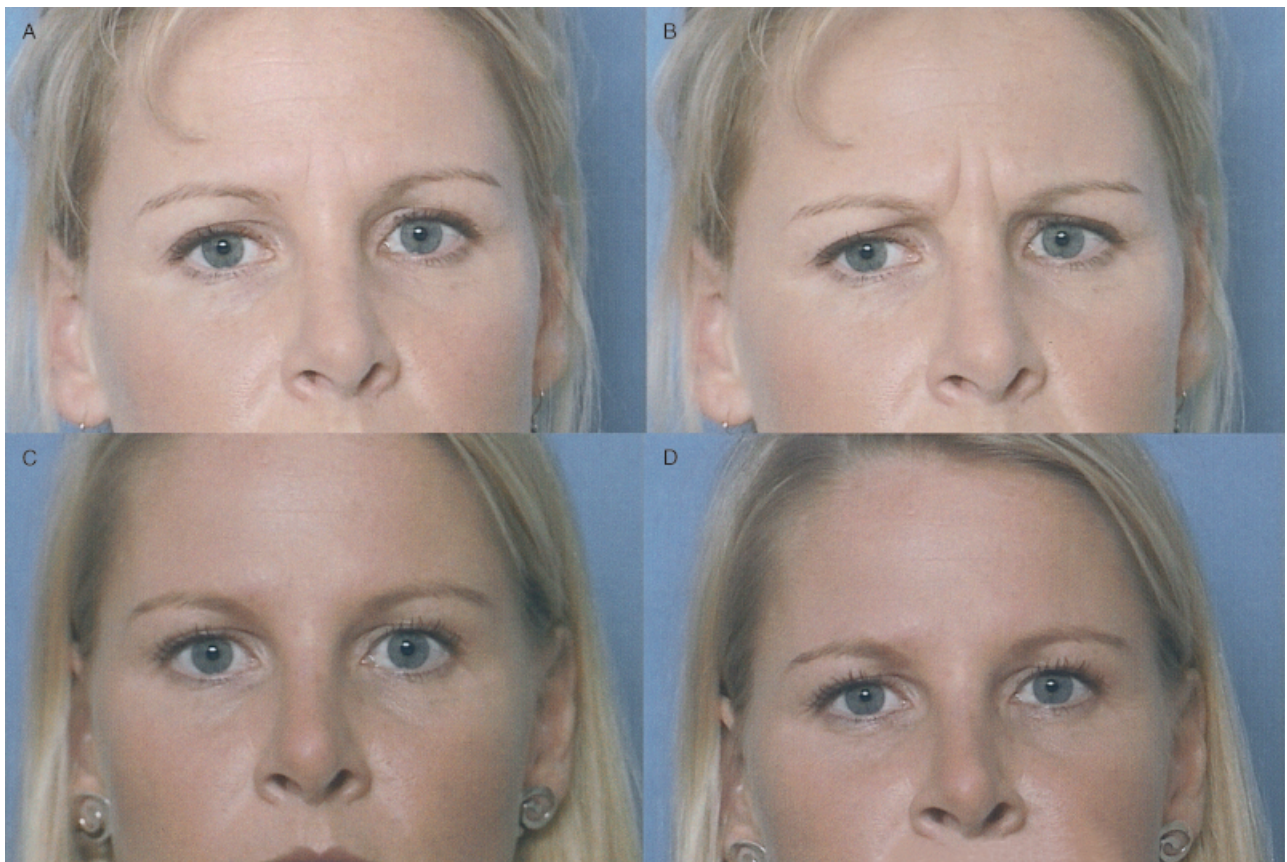


Figure 1. A 28-year-old female. (A) At rest, showing static glabellar lines. (B) Contraction of corrugator muscles showing dynamic glabellar lines. (C) After 25 units of botulinum toxin type A, at rest showing resolution of static line. (D) After botulinum toxin type A at maximal contraction, showing resolution of dynamic lines.

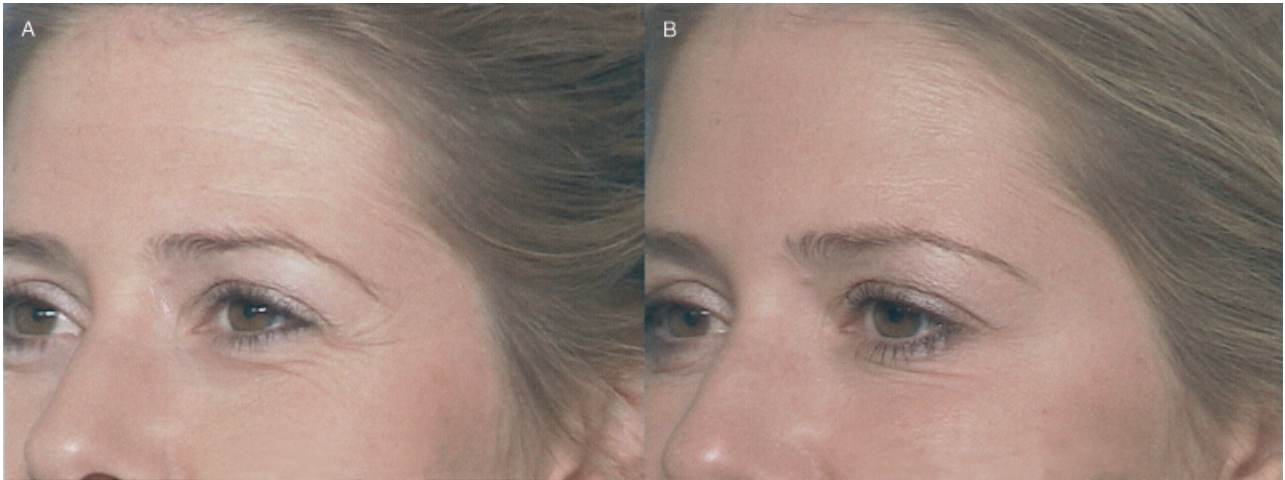


Figure 2. A 32-year-old female. (A) Smiling, showing dynamic orbicularis lines and static horizontal forehead lines. (B) Smiling, after botulinum toxin type A, showing resolution of both static forehead lines and dynamic orbicularis lines.

Social Implications of Hyperfunctional Facial Lines

Communication

The interpretation of facial expressions is an integral component of interpersonal communication. It is primarily universal and constant across time and cultures.⁸ An individual with the brows depressed, furrows between the brows, lines on the forehead, and a downward-turning mouth is universally interpreted to be angry or displeased. However, when these lines become permanent, their presence in the face at repose incorrectly signals an emotion that is not felt or, as Khan described, represents a “malfunction of the facial organ of communication.”⁷ These facial miscues create a mismatch between an individual’s emotion and the societal interpretation of the implied facial expression, which can lead to miscommunication. In fact, patients with facial neuromuscular dysfunction who have difficulty in accurately communicating their feelings and intentions have been shown to be at higher risk of depression and anxiety.⁹ For individuals with facial lines that transmit facial miscues, the inability to convey accurately their emotions with their facial expression may be equally frustrating.

For example, an ingrained glabellar crease alone on the face may incorrectly be interpreted as signaling anger, anxiety, or irritation. Khan described patients with glabellar furrows who sought treatment not because of some arbitrary notion of beauty but because the furrows conveyed anger or disapproval. The patients wanted to correct the facial feature that was responsible for this communication miscue.⁷ In our practice, we find this to be a common motivation of patients seeking treatment.

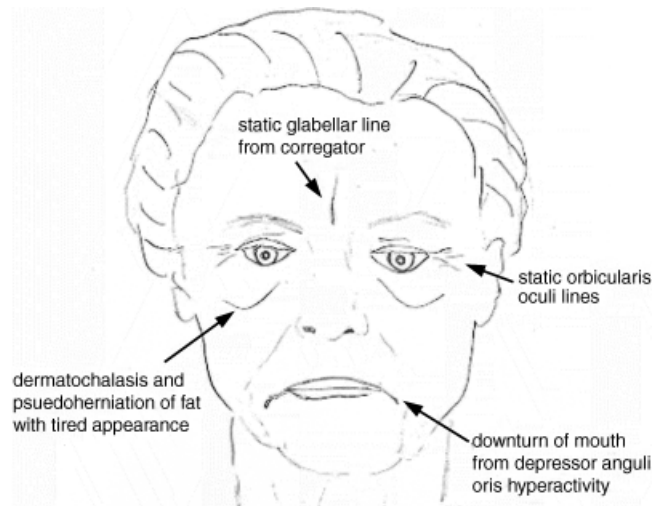


Figure 3. Multiple facial miscues. Subject is cheerful and happy but projects an affect of being tired, angry, and sad.

With aging, facial malposition may errantly communicate a negative emotion. For instance, with aging, the corner of the mouth will often droop, creating an appearance that may be interpreted as displeasure or sadness. Similarly, aging may cause the brow to droop, the upper lid to sag, and the lower eyelid fat to bulge, presenting an appearance of drowsiness or exhaustion. The internal emotion may be quite different from the message received by others. A disparity between internal mood and external appearance can be a source of significant anxiety for patients.

Patients often do not fully understand the source of this anxiety. Many patients voice a feeling of disconnect between their inner selves and the face that they see in the mirror. These feelings are then confirmed and compounded in their social interac-

tions. An innocuous comment (such as “did you sleep well last night?”) can be perceived as a harsh confirmation of this incongruity, exacerbating the resulting anxiety.

Attractiveness

The apparent age of the face strongly influences the societal perception of its attractiveness. Norms of beauty are closely tied to a youthful appearance, especially in females. This intrinsic and cross-cultural preference for youth may be evolutionarily related to an impression of reproductive fertility. In some societies, signs of aging can be favorable, implying wisdom and commanding respect. In much of our society, however, youthful appearance is equated with beauty, desirability, sexuality, and success, whereas signs of aging can carry connotations of decrepitude and inadequacy.^{10,11} Certainly, many older-appearing individuals are often attractive and vibrant. However, as individuals age, those who maintain a more youthful appearance tend to be healthier, have a more positive outlook on life, and live longer.¹²

Self-esteem

The self-perception and self-esteem of an individual are influenced by how the individual is perceived by others.¹⁰ An individual who is perceived to be attractive is more apt to elicit positive responses, and these reinforce a positive self-image and promote the psychologic health of the individual. Similarly, the perception of the emotional state and attractiveness of an individual by others may have a profound influence on the individual's societal interactions. In “reciprocal behavior,” the behavior of an individual is influenced by the behavior of those with whom the individual interacts. A smile is more likely than a frown to elicit a smile from another. Positive responses usually reinforce positive behavior, leading, in turn, to a higher probability of continued positive behavior, often enhancing interpersonal relationships.

Treatment of Hyperfunctional Facial Lines

Rationale for Treatment

For an individual, the presence of hyperfunctional facial lines has implications beyond considerations of attractiveness because they affect the perception of the emotions and perceived personality traits of the individual. Facial expressions should change spontaneously when individuals experience an emotion such as fear, happiness, anger, or disgust. Facial expressions may also be used consciously to obtain a social goal, as



Figure 4. The authors' daughter using facial expression to obtain pet rabbit.

when a smile is produced to attract attention or support¹³ or to communicate nonverbally⁷ (Figure 4).

For patients in whom hyperfunctional lines result in facial miscues that interfere with the accurate communication of emotions, treatment to smooth hyperfunctional facial lines may be warranted. Patients may also be treated in order to obtain a more youthful appearance because many hyperfunctional lines (e.g., crow's feet and frown lines) appear normally during aging and are perceived as visible signs of aging. Their presence detracts from the attractiveness of the individual and may result in reduced societal expectations and opportunities. Beyond smoothing hyperfunctional lines to correct facial miscues and decrease visible signs of the aging process, treatment of hyperfunctional facial lines is warranted for those patients who simply want to look their best. Self-esteem is an important component of social interactions, and individuals who feel as though they look their best may have a more positive attitude in their dealings with others.

Treatment Options

Many treatment options are available for the smoothing of facial lines. Depending on the location and depth of the lines, laser skin resurfacing, botulinum toxin type A injections, nonablative light treatments, soft tissue augmentation, laser skin resurfacing, and surgery can be used alone or in combination to create a more attractive, youthful appearance and to allow the face to communicate desired emotions and personal characteristics effectively (Table 1 and Figure 5). Effective treatment depends on accurate diagnosis of the problem and frank discussions with the patient regarding goals, expectations, outcomes, duration, and

Table 1. Hyperkinetic Facial Lines: Etiology, Effect, and Treatment Options

Facial Structure	Effect of Hyperfunctional Lines	Cause/Muscle	Treatment Options
Glabella	Worry, concern, anger, tension	Corrugator supercilii hyperactivity	Chemodenervation, muscle resection, motor nerve section, brow lift
Forehead	Worry, surprise	Frontalis hyperactivity	Chemodenervation, browlift
"Crow's feet"	Aged appearance	Orbicularis oculi	Chemodenervation, browlift
Upper lip	Aged appearance	Orbicularis oris	Soft tissue fillers, chemodenervation
Corner of the mouth	Sadness, sour	Depressor anguli oris	Chemodenervation, subperiosteal midface lift

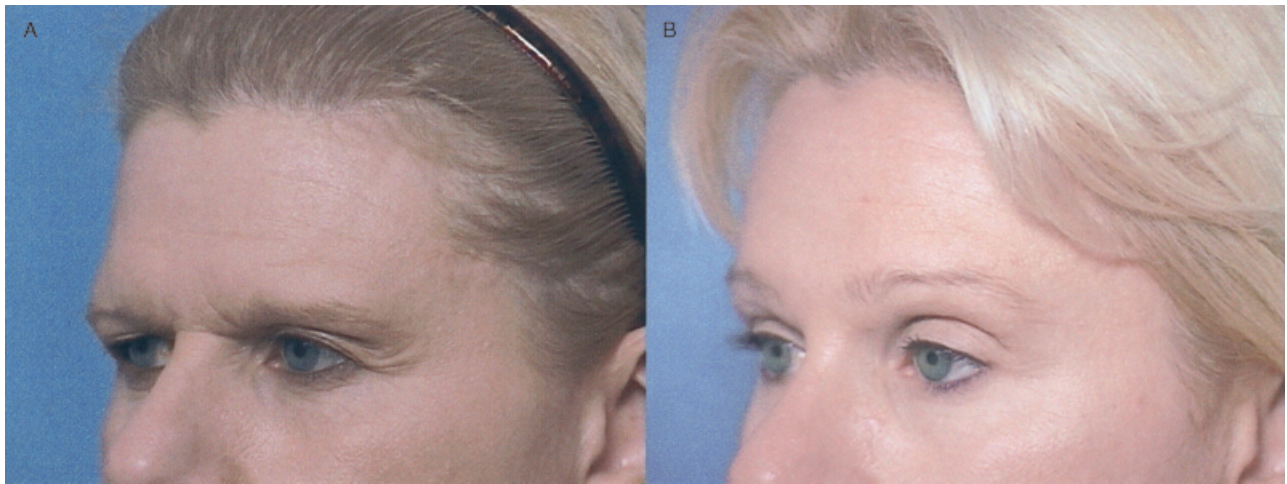


Figure 5. Endoscopic brow lift improving projected affect and static lines. (A) Before brow lift, with unintended affect of sternness and anger. (B) Two years after endoscopic brow lift.

cost. Often patients may not be able to verbalize easily their displeasure with a particular feature but instead are motivated toward improvement after a particular social interaction. For instance, a coworker may ask these questions: "Why are you angry?" "Are you tired?" Once educated about the misperception of facial expression, they will better understand the rationale of treatment.

In our practice, a significant change in internal mood is often observed following cosmetic surgery or the use of botulinum toxin type A. This increase in patient happiness may be measured with patient reported outcomes questionnaires. We often hear patients report that they feel more rested after treatment to relax the corrugator muscles. These muscles contract to form glabellar creases, communicating stress, anger, or displeasure. With surgery or botulinum toxin type A injections, the external manifestations of stress (corrugator hyperactivity and glabellar rhytids) are reduced. After treatment, patients often report improvement in mood and decreased levels of stress. The mechanisms of this response are unclear but may be related to the social response to the change in appearance. In other words,

people may respond more positively to a more relaxed face, improving the affect of the patient receiving treatment. Alternatively, this effect may be due to an interruption of the biofeedback of tension-causing muscle hyperactivity. This decreased muscle tension may be the mechanism for reduction of headaches seen with botulinum toxin type A treatments.¹⁴ We have found that many patients who initiate treatment for wrinkles continue their treatment to improve headaches.

Patient satisfaction can and should be objectively studied. Use of patient reported outcomes is an increasing trend in medical research as a way to study our results. In a separate study in this journal, we report the development of a questionnaire using the five-step process recommended by the Patient Reported Outcomes Harmonization Committee. This tool can accurately measure our success in improving patient quality of life with our cosmetic treatments.¹⁵ When completed, this questionnaire should be a valuable, reliable tool to measure our results of various treatments not in millimeters and physical grades, but in patient satisfaction. Patient happiness should always be the ultimate goal that is clearly in our minds.

There are several other frontiers opening to study the impact of these procedures on patients' lives. Studies should be done looking at psychologic profiles before and after treatment to determine changes in mood and affect. To examine the social ramifications of our procedures, one could present before and after photos to blinded observers to judge reactions to different appearances. Tools should be developed to study different procedures on patients' lives to judge better where we are being successful in our treatments in an objective fashion.

Conclusion

The face is a critical feature of communication, and facial appearance profoundly affects self-perception, self-esteem, and the interactions of an individual with others. In our society, a youthful appearance with smooth, unlined skin is most attractive and connotes an active and capable individual. Because hyperkinetic facial lines can send emotional miscues and are regarded as a sign of aging, the presence of these lines can have a negative impact on both societal impressions of the individual and the self-esteem of the individual. Treatment to smooth these lines is warranted for individuals who believe that their faces are not communicating properly, who want to delay the outward appearance of aging, or who simply want to look their best. The benefits of this treatment go well beyond aesthetic improvements. Enhanced facial appearance can be expected to result in improved psychological well-being and improved social functioning.

As healthcare practitioners in the cosmetic arena, our primary goal must be patient happiness. As scientists, we are often focused on the physical results of our procedures, measuring our procedures with photography, calipers, and optical profilometry. We should not forget to also measure our results with tools to assess patient satisfaction. We must remember that the true goal of any cosmetic treatment is not the elimination of an imperfection, but patient happiness.

As physicians and patients better understand sources of anxiety, such as the disconnect between appearance and affect, and the social responses to appearance, we will be better prepared to treat that anxiety, leading to increased patient happiness. The greater the understanding both physicians and patients have of the links between physical appearance, social responses, and internal mood, the better the results that can be obtained.

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