

Myomodulation with Injectable Fillers: An Innovative Approach to Addressing Facial Muscle Movement

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Abstract Consideration of facial muscle dynamics is underappreciated among clinicians who provide injectable filler treatment. Injectable fillers are customarily used to fill static wrinkles, folds, and localized areas of volume loss, whereas neuromodulators are used to address excessive muscle movement. However, a more comprehensive understanding of the role of muscle function in facial appearance, taking into account biomechanical concepts such as the balance of activity among synergistic and antagonistic muscle groups, is critical to restoring facial appearance to that of a typical youthful individual with facial esthetic treatments. Failure to fully understand the effects of loss of support (due to aging or congenital structural deficiency) on muscle stability and interaction can result in inadequate or inappropriate treatment, producing an unnatural appearance. This article outlines these concepts to provide an innovative framework for an understanding of the role of muscle movement on facial appearance and presents cases that illustrate how modulation of muscle movement with injectable fillers can address structural deficiencies, rebalance abnormal muscle activity, and restore facial appearance.

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Keywords Myomodulation · Injectable fillers · Hyaluronic acid · Esthetic facial procedures · Palsy

Introduction

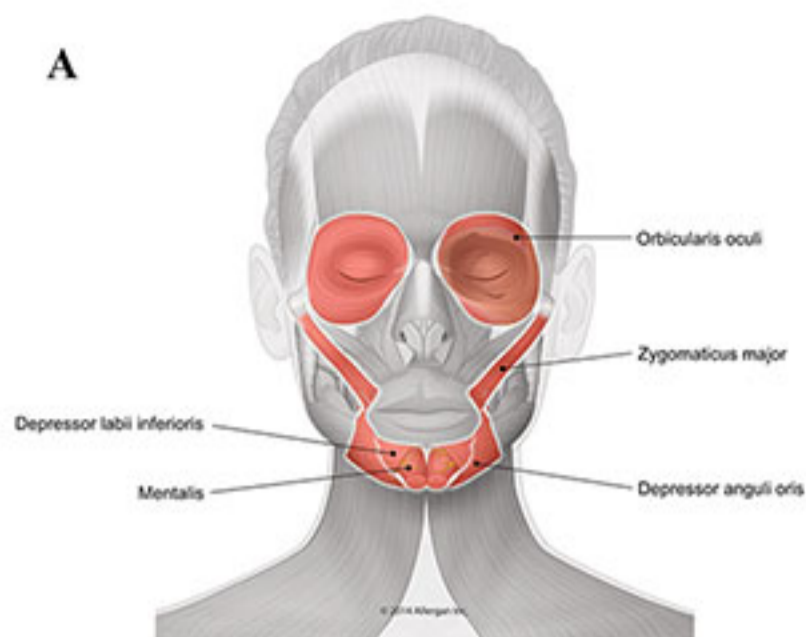
Theories of facial aging have largely focused on changes in skin, underlying fat, and bone that result in sagging and folds [1], while the role of muscle in aging has generally been neglected [2]. The complementary and distinct ways in which injectable fillers and neuromodulators have generally been used for rejuvenation and improvement of facial esthetics [3] illustrate how skin and fat are considered separately from muscle action. Injectable fillers are customarily used to fill static wrinkles, folds, and localized areas of volume loss [4–7]. Neuromodulators (such as onabotulinumtoxinA) are used to reduce muscle movement in overacting muscles, for example, to diminish hyperdynamic lines or correct position or asymmetry by reducing muscle activity [8–13]. However, long-term observations of patients with certain structural deficiencies treated only with injectable fillers suggest that fillers can also be used to alter muscle movement (myomodulation) in facial esthetic treatments and may provide another tool, in addition to neurotoxins, in the armamentarium of facial muscle modulation.

In the facial literature, consideration of the role of functional muscle groups, including synergists and agonist/antagonist pairs, is focused on the opposing actions of brow levators and depressors, which has guided clinical practice [14, 15]. However, it is clear that functional muscle groups contribute to facial movement and appearance, not just in the example of the brow, but throughout the face. Structural deficiency in either bone or fat pads can precipitate abnormal movement patterns, and such an imbalance,

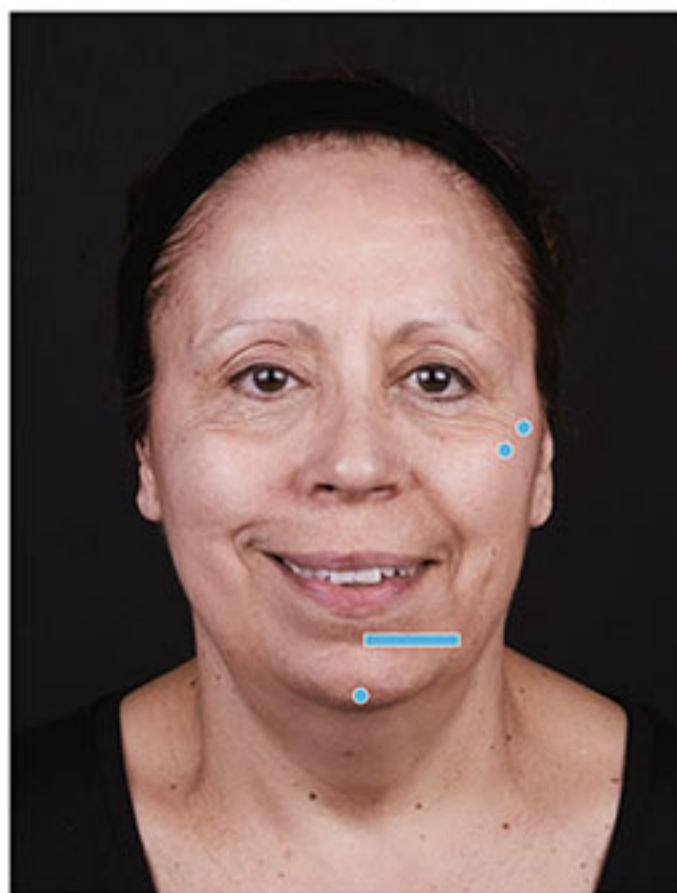
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Fig. 2 Case 1: Asymmetric smile. The patient was treated on both sides at the zygomatic arch and on the chin on her left side only. Voluma was injected at the bone, 0.1 mL at the zygomatic arch on her right side and 0.1 mL at the zygomatic arch and 0.1 mL at the zygomatic eminence on her left, using a 27-g needle to increase the mechanical advantage of the zygomaticus major. Voluma was injected in labiomental angle superficial to the depressor anguli oris (DAO) (0.7 mL) and chin apex (0.3 mL) using a 25-g blunt microcannula and a fanning technique. **a** Muscles involved. **b** Injection sites (blue markings; dot = bolus injection, bar = fanning). **c** Before treatment (left), the patient has a stronger action of zygomaticus major on her right side (zygomatic smile). On her left side, we notice that her zygomatic is weaker and her DAO is stronger compared with her right side, creating a DAO smile. Note that immediately after treatment (right), the corner of her mouth on her left side is lifted and her smile is more symmetrical. The corners of her mouth are more evenly positioned due to facilitation of zygomaticus major muscle bilaterally and reduced contraction of the DAO on the patient's left side



B



C

