

An Integrated Approach to Facial Synkinesis: Neurophysiology, Zonal Assessment, and Multidisciplinary Management

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Background: Facial synkinesis is a disabling sequela of facial nerve injury characterized by involuntary co-contraction, resting hypertonicity, and impaired selective motor control. Oral-ocular and ocular-oral patterns can disrupt eye protection, smile, speech, and mastication, while pain and altered expression add to psychosocial burden. Its variable regional presentation calls for assessment and treatment tailored to each patient's pattern.

Methods: We conducted a narrative synthesis of published clinical and mechanistic evidence and integrated original clinical photographs of patients treated by our team to illustrate zonal assessment and targeted chemodenervation. We examined peripheral and central mechanisms; findings at rest and during movement; clinician-rated and patient-reported measures; and the roles of facial rehabilitation, botulinum toxin type A (BTX-A), and surgery.

Results: After facial nerve injury, regenerating axons may reinnervate inappropriate muscle groups, producing involuntary co-contraction. Persistent hyperinnervation, facial motor nucleus hyperexcitability, and cortical reorganization also contribute to resting tightness and impaired movement control. These mechanisms produce distinct patterns across the upper face, eyelids, midface and nose, mouth, neck, and auricular region. Examination at rest and during standardized expressions identifies the muscles responsible for each patient's functional limitations and guides conservative, targeted BTX-A treatment. Figures featuring patients cared for by our team illustrate improvements in brow contour, eye opening, nasal ala and upper-lip position, smile excursion, and relief of platysmal tightness after region-specific injections. Neuromuscular retraining addresses maladaptive movement patterns and can be paired with BTX-A to support motor relearning. In a separate published cohort of 140 patients, two BTX-A injections combined with retraining were associated with a mean 11.76-point increase in Sunnybrook score and a 4.78-point decrease in synkinesis score. Selective neurectomy or myectomy may be considered for refractory symptoms. Sunnybrook, eFACE, the Synkinesis Assessment Questionnaire, and serial photographs and videos capture clinician-rated function and patient experience.

Conclusions: Facial synkinesis reflects interacting peripheral and central disturbances of motor control. A zonal examination links neurophysiology to functional goals and directs coordinated care among neurology, facial plastic surgery, and specialized rehabilitation. Early referral for retraining may lessen later synkinesis severity; staged chemodenervation and selective surgery address evolving or refractory patterns. Evidence for many interventions remains limited, underscoring the need for consistent outcome measurement.