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Review Article

Functional facial asymmetry after aesthetic botulinum toxin treatment: a narrative review and a proposed activating manual correction algorithm

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Abstract

Background: Asymmetry of facial expression is among the most frequent adverse outcomes of aesthetic botulinum toxin type A treatment. Guidance on managing established asymmetry rests on low-level evidence, and non-pharmacological correction has received little attention.

Objective: To review the anatomical and functional mechanisms of asymmetry after aesthetic botulinum toxin treatment and, on this basis, to justify an algorithm for activating manual correction.

Methods: Narrative review of publications on toxin spread, anatomical variability of the mimetic muscles, compensatory movement patterns, management of adverse events and facial rehabilitation, combined with a description of the author's Botulinum Toxin Recovery Massage (BTRM) method and a summary of the author's clinical experience with 15 patients (2023–2025).

Results: Five mechanisms of functional asymmetry are proposed: reduced recruitment of a partially affected zone, compensatory hyperactivity of unaffected muscles, residual activity of an undertreated muscle segment, uneven bilateral effect, and pre-existing asymmetry unmasked by treatment. A two-level algorithm is proposed. Level 1 is manual correction, combining activation of under-recruited zones with offloading of compensatory zones, started no earlier than 2 weeks after the last injection. Level 2 is a physician-performed touch-up with toxin, reserved for patients whose injection parameters (product, dose, sites) are known. Clinical signs, selection criteria and red flags are given for each mechanism.

Conclusions: The algorithm links the choice of correction to the mechanism of asymmetry and may reduce the need for additional toxin doses. The effectiveness of BTRM has not been established; a controlled study with blinded outcome assessment is required, and its design is proposed.

Keywords: botulinum toxins, type A, facial asymmetry, facial muscles, massage, adverse effects

Running title

Functional asymmetry after botulinum toxin

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1. Introduction

Injection of botulinum toxin type A (BoNT-A) is the most frequently performed aesthetic procedure; in the United States alone, about 7 million BoNT-A procedures were performed in 2016 [1]. The treatment is generally safe, yet clinically relevant adverse events do occur [2]. In a systematic review of clinical studies, eyelid ptosis was reported in 2.5% of cases, brow ptosis in 3.1% and lip asymmetry after lower-face treatment in 6.9% [3].

Asymmetry of facial expression matters disproportionately to patients: even purely cosmetic deformities of the brows or the smile cause distress and reduce satisfaction with treatment [2]. Most of the literature, however, concerns prevention. The management of asymmetry that has already developed is described far less thoroughly; it is predominantly conservative and supported by low-level evidence [2].

In practice, a patient with moderate asymmetry is usually offered either an additional dose of toxin or waiting until the effect wears off. Manual methods have scarcely been examined in this setting. Even the effect of massage immediately after injection has not been studied directly [1], and the present review identified no studies of manual correction of asymmetry after aesthetic BoNT-A treatment. Conventional facial massage is also relaxing by design, although part of the musculature has already been weakened by the toxin.

In previous work, the author proposed, on the basis of clinical observation, that the outcome of botulinum therapy depends on how well the injection scheme matches the patient's individual functional map of the face. Where the two diverge, asymmetry arises from the relative dominance of muscles left untouched by the toxin [4]. This model underlies the author's method of activating manual correction [5].

1.1. Aim

To analyze the mechanisms of functional asymmetry after aesthetic BoNT-A treatment and, on this basis, to justify an algorithm in which the choice of correction (manual correction, toxin touch-up, or both) follows from the mechanism.

Objectives

1. To describe the mechanisms of asymmetry reported in the literature.
2. To appraise existing correction approaches and their limitations.
3. To describe the author's BTRM method and the boundaries of its application.
4. To propose a decision algorithm.
5. To propose a study design for testing the method's effectiveness.

2. Review methods

This is a narrative review and does not claim to be systematic. The literature was searched in November 2026 in PubMed/MEDLINE, PubMed Central and the Cochrane Library, without restriction on publication year but with priority given to the last 10 years; English-language publications were considered. Search terms included combinations of: botulinum toxin, complications, adverse events, asymmetry, brow ptosis, eyelid ptosis, smile asymmetry, diffusion, spread, frontalis, depressor anguli oris, compensation, massage, manual therapy, facial exercise, neuromuscular retraining and facial grading.

Systematic reviews, randomized trials, anatomical studies and consensus statements were preferred; case reports and expert guidance were included when they illustrated a specific mechanism. Studies of rehabilitation in facial nerve palsy were considered as an analogy, with the caveat that they concern a different population. As is usual for a narrative review, the numbers of records retrieved and excluded were not formally recorded.

The description of the method is based on the author's methodological manual [5] and clinical practice. The clinical experience was gained in the author's practice in Cyprus, where she worked from 2023 after completing training in facial massage techniques. Between 2023 and 2025, 15 patients with functional asymmetry after aesthetic BoNT-A treatment were managed with the method (6 in 2023, 5 in 2024 and 4 in 2025). Only manual correction (level 1) was applied in this practice; toxin touch-ups, when needed, were performed by the patients' treating physicians. This experience is reported in generalized form, without personal data or quantitative outcome measures, because no prospective data collection was undertaken.

3. Mechanisms of functional asymmetry

Asymmetry after BoNT-A treatment rarely has a single cause. Four groups of factors are considered below: spread of the toxin, anatomical variability, secondary compensation and pre-existing asymmetry.

3.1. Toxin spread and the time course of action

The toxin may act beyond the target muscle. The extent of spread depends on modifiable factors - dose, concentration and injection volume [6, 7]. Contraction of the muscle at the injection site alters the pattern of spread [6]. Facial exercise in the first hours after injection brings the onset of effect forward by about one day, but the difference disappears by two weeks and the duration of effect is unchanged [8]. It has also been hypothesized that spread may continue for several days after injection [9], although the supporting evidence is limited.

The effect peaks at about two weeks, which is when results are usually assessed [10]. Function is then restored through axonal sprouting and the resumption of transmission at the original synapses - a slow biological process that takes months [11, 12]. There is no evidence that mechanical stimulation accelerates it. The author's manual therefore states explicitly: "The method supports function within a safe range but does not override the natural time course of recovery" [5, p. 60] *(translated from Russian by the author)*. The phases of toxin action and the window in which the method is applied are shown in Figure 1.

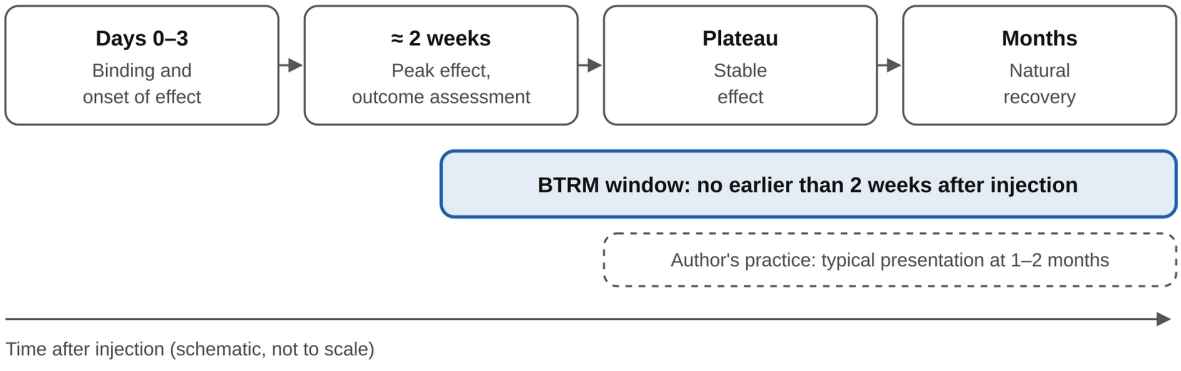


Figure 1. Phases of botulinum toxin action and the window for applying BTRM (author's schematic based on [8, 10–12])

The method starts once the toxin effect has peaked, and a course partly overlaps with the phase of natural

recovery - a limitation discussed in Section 8.2.

3.2. Anatomical variability

The borders and shape of the mimetic muscles vary between individuals. The lateral border of the frontalis varies [13], and the muscle itself has several morphological types [14]. In the lower face, the depressor anguli oris partly overlaps the depressor labii inferioris, and unilateral action on these muscles produces asymmetry of the mouth [15]. A standard injection chart does not account for these differences. In the 2025 study, the author described this as a discrepancy between the standard injection chart and the patient's actual functional map [4].

3.3. Balance of forces and secondary compensation

Facial expression results from the interplay of antagonist and synergist muscles; brow position, for example, is set by the balance between the frontalis and its antagonists [16]. As the author put it in the 2025 study, the result of botulinum therapy "is determined not only by the degree of relaxation of a particular muscle, but also by the overall balance of forces between antagonistic and synergistic muscles" [4].

When the toxin weakens one part of this system, unaffected muscles begin to dominate. Recruitment of synergists is how secondary lines such as "bunny lines" arise [17]. In a published case, weakening of the depressor labii inferioris on one side after lower-face treatment was accompanied by hyperfunction of the same muscle on the opposite side [18]. In terms of the author's model, this is relative dominance of unaffected muscles [4]: the asymmetry is created not only by the weakened side but also by the intact one.

3.4. Pre-existing asymmetry

Some degree of brow asymmetry is present in most people [19]. Before treatment it is often masked by compensatory muscle activity; once the toxin removes that activity, the asymmetry becomes visible. The goal of correction should therefore be a return to the patient's individual baseline pattern of expression rather than ideal symmetry that the patient never had.

4. Region-specific patterns

The mechanisms in Section 3 produce characteristic pictures in each facial region (Table 1). Recognizing the regional pattern helps to identify which muscles are under-recruited and which are compensating.

4.1. Upper face

The best-known pattern is the lateral brow peak ("Mephisto sign" or "Samurai" brow), which develops when lateral frontalis fibers are spared and continue to pull on the lateral brow [13]. Its counterpart is brow ptosis, regarded as the principal adverse effect of forehead treatment [19]. After glabellar treatment, diffusion into the medial frontalis fibers can produce unexpected brow elevation [19]; these and other upper-face complications are summarized by Borba et al. [20]. Eyelid ptosis results from diffusion of toxin through the orbital septum to the levator palpebrae superioris [19, 21]; it typically appears 3–14 days after injection [21] and differs in nature from the muscle imbalance patterns discussed here.

4.2. Middle face

Recruitment of the nasalis after treatment of the glabellar complex produces secondary "bunny lines" [17] - a clear example of compensation by a synergist. Injections for crow's feet placed beyond the confines of the orbicularis oculi may weaken the lip elevators and cause lip ptosis [19], affecting the smile on the treated side.

4.3. Lower face

Because the depressor anguli oris and the depressor labii inferioris partly overlap, injection at an inappropriate site or depth may produce unwanted changes in facial animation [15, 22]. Weakening on one side may be followed by relative hyperfunction on the other, as in the published case of lower-lip asymmetry [18]. In the author's practice, the most frequent presentations concerned the perioral region: an over-corrected, flattened smile, and a smile more pronounced on one side (Section 7.2).

Table 1. Typical patterns of functional asymmetry by facial region

Region	Typical pattern	Likely mechanism (see Table 4)	Sources
Forehead and brows	Lateral brow peak ("Mephisto sign")	Residual activity of lateral frontalis (M3)	[13, 16]
Forehead and brows	Brow ptosis, one-sided or bilateral	Reduced recruitment of frontalis (M1); unmasked baseline asymmetry (M5)	[19, 20]
Periorbital	Eyelid ptosis	Spread to levator palpebrae - red flag, physician management	[19, 21]
Nose and glabella	Secondary "bunny lines"	Compensatory hyperactivity of nasalis (M2)	[17]
Midface	Lip ptosis, weaker smile on one side	Reduced recruitment of lip elevators (M1); uneven bilateral effect (M4)	[19]
Perioral and chin	Stiff lips, movement shifted to the chin; lower-lip asymmetry	Reduced recruitment of orbicularis oris or lip depressors (M1) with compensatory hyperactivity (M2)	[15, 18, 22]

5. Current correction approaches

Existing approaches fall into four groups; none of them addresses functional work with weakened zones after aesthetic BoNT-A treatment (Table 2).

5.1. Observation

Most adverse events resolve spontaneously [3]. Eyelid ptosis often settles within 3–4 weeks and brow ptosis within about 6 weeks [19]. Throughout this period, however, the patient lives with the defect, and compensatory movement patterns are left uncorrected.

5.2. Toxin touch-up

An additional dose is directed at the dominant side or at a spared muscle segment. If a dropped brow cannot be raised, symmetry can be restored by carefully lowering the other brow [19]; lower-lip asymmetry has been corrected by injecting the hyperactive muscle on the opposite side [18]. The main limitation is immunogenicity. Treatment intervals shorter than 3 months, high cumulative doses and booster injections within 3 weeks of

the initial treatment are described as risk factors for secondary non-response [23, 24]. A touch-up is also problematic when the patient was treated by another practitioner and the product, dose and injection sites are unknown.

5.3. Pharmacological treatment of eyelid ptosis

Adrenergic eye drops (oxymetazoline, apraclonidine) produce partial improvement [21]. This addresses one specific complication, not asymmetry of expression as a whole.

5.4. Functional rehabilitation

No direct data exist for aesthetic BoNT-A treatment, but facial nerve palsy offers an analogy. Tailored facial exercises improve facial function, although the quality of evidence is low [25, 26]. In synkinesis, neuromuscular retraining improved symmetry more than botulinum therapy alone [27], and rehabilitation was more effective when preceded by toxin injection [28]. In healthy volunteers, manual facial techniques changed muscle tone and facial contour [29]. No studies of manual correction of asymmetry after aesthetic BoNT-A treatment were identified, and even the effect of post-injection massage has not been assessed directly [1].

Table 2. Approaches to correcting asymmetry after botulinum toxin treatment

Approach	Target	Level of evidence	Limitations	Sources
Observation	Spontaneous resolution	Systematic review; expert opinion	Weeks with the defect; compensation not addressed	[3, 19]
Toxin touch-up	Dominant side, spared segment	Expert opinion; case reports	Immunogenicity; does not correct weakness; requires known injection parameters	[18, 19, 23, 24]
Adrenergic eye drops	Eyelid ptosis	Reviews; case series	One complication only; partial effect	[21]
Functional rehabilitation	Coordination and symmetry of movement	Systematic reviews and small RCTs in facial nerve palsy	Different population; no data for aesthetic practice	[25–28]

6. The author's method: Botulinum Toxin Recovery Massage

BTRM is a protocol-based manual correction of functional imbalance of facial expression after botulinum therapy, described in detail in the author's methodological manual [5]. "Recovery" in the name refers to restoring functional balance and coordination of expression, not to accelerated release of the muscle from neuromuscular blockade. The manual states explicitly that the method does not replace medical correction and is not a means of accelerated toxin elimination [5, p. 47].

6.1. Core principle: activation rather than relaxation

"The author's novelty lies in shifting the focus from relaxing intervention to activating functional correction" [5, p. 16] *(translated from Russian by the author)*. The rationale is that, after botulinum treatment, "some muscles are already in a state of reduced activity, and the patient's complaints may stem not from excess tone

but from impaired coordination between zones" [5, p. 17] *(translated from Russian)*. Hence the method's central concept: reduced muscle recruitment as an object of assessment and intervention in its own right [5].

The method works in two modes:

- Activation of under-recruited zones: short, dosed stimuli with a defined direction of movement, verbal cueing and immediate release.
- Offloading of compensatory zones: reducing excessive participation of unaffected muscles, together with work on fascial connections that limit tissue gliding.

The two modes are complementary: "Sometimes the best result is achieved not by direct stimulation of the weak zone, but by reducing the excessive participation of the neighboring one" [5, p. 60] *(translated from Russian)*. Technical details of the individual maneuvers are given in the manual [5].

6.2. Protocol stages

1. Assessment. Complaints and time of onset; date of injection and treated zones, if known; analysis of asymmetry at rest and in motion using standard expression tests. The output is a functional map scored in four domains (asymmetry, reduced recruitment, compensatory tension and subjective discomfort), each rated from 0 to 3: 0, absent; 1, mild and visible only on careful examination; 2, moderate and noticeable to the patient; 3, marked, affecting function or requiring medical assessment. If any red flag is present, the score is not used to decide on massage, and the patient is referred for medical assessment [5, p. 53].
2. Tissue preparation. Gentle work on zones where tension and restricted gliding amplify the visible imbalance.
3. Correction. The author's maneuvers in a set sequence: offloading of compensatory zones, dosed activation and work on fascial connections. After each block the patient performs a control movement; if it worsens, intensity is reduced or the block is stopped [5].
4. Control and documentation. Re-assessment with the same tests; record of the baseline picture, the stages performed and the tissue response. Standardized documentation also supports quality control when the method is taught to other practitioners [30].
5. Follow-up. For persistent findings, a plan of repeat sessions with intervals and effectiveness criteria. In the author's practice sessions are held once a week so that progress can be judged between them; 4–6 sessions are usually needed.

In the author's practice, a session begins with a brief warm-up of the whole face and then proceeds zone by zone according to the muscles involved. Each muscle is worked for about 2–4 minutes, until the practitioner feels it begin to respond with resistance; the practitioner then moves to the next muscle, and the cycle is repeated several times. The components of a session are summarized in Table 3.

Table 3. Components of a BTRM session, dosing and stopping criteria

Component	What is done	Dosing	Stop or change course if	Sources
Baseline assessment	Rest, then brow raise, frown, smile, lip closure, lip pucker, relaxation; same position, lighting and commands each time	Before every session	Red flags or marked deterioration: medical assessment before any manual work	[5, pp. 56, 61]
Tissue preparation (warm-up)	Calm contact and gentle superficial displacement of tissues over the whole face; no intensive rubbing, aggressive lymphatic drainage or deep periorbital pressure	Brief; must not turn into a long relaxing massage	Pain, marked redness, worsening of movement on re-check	[5, pp. 58–59]
Offloading of compensatory zones	Gentle superficial and mid-depth displacement, holding, light painless vibration, dosed stretching within comfort	One or two key areas; short sets with pauses; control movement after each block	Zone softens but movement worsens: reduce intensity or stop. Forceful pressure, work through pain and prolonged pressure over neurovascular areas are not allowed	[5, p. 59]
Activation of under-recruited zones	Light sensory stimulation, brief directional guidance by the hand, a minimal facial movement by the patient, then immediate relaxation	Small repetitions in short cycles; about 2–4 min per muscle in the author's practice	A neighboring zone switches on: return to offloading or end the block. No response or increased weakness: do not force	[5, p. 60]
Control and documentation	The same movements under the same conditions; baseline and repeat score recorded	After the session and at the next visit	No change is recorded as such	[5, p. 61]
Course	Sessions once a week	Usually 4–6 sessions in the author's practice	No improvement on re-assessment: plan reviewed individually	Author's practice

6.3. Timing, contraindications and stopping rules

6.3.1. Timing

No earlier than 2 weeks after the last injection, including any touch-up. By then the toxin effect has peaked [10], and post-injection muscle activity no longer measurably influences the result [8]. In the author's practice in Cyprus, patients presented mostly 1–2 months after injection; when the treating physician had performed a touch-up, massage was started about one month after it.

Why manual work at this stage is not expected to displace the toxin. Patients are commonly advised to avoid massage after botulinum treatment because pressure might move the toxin. This concern applies to the first hours and days after injection. Uptake into nerve terminals is generally considered rapid, although a

hypothesis of spread over several days has been proposed [9]. In the only randomized trial of post-injection muscle activity, exercise in the first hours changed the time of onset but neither the effect at two weeks nor its duration [8]. The two-week threshold is chosen so that manual work begins after this window, once the effect has peaked [10]. Direct data on massage at this stage are lacking [1], so the threshold should be regarded as a precaution rather than a proven safety limit.

6.3.2. Contraindications

Active skin inflammation or infection, flare of a dermatosis, incomplete healing after surgery or trauma, pain of unclear origin, suspected neurological disease [5].

6.3.3. Outside the scope of the method

True eyelid ptosis caused by toxin action on the levator palpebrae superioris, diplopia, and marked impairment of speech, swallowing or eye closure. These require medical assessment and treatment [21].

6.3.4. Stopping and review

Increasing pain, worsening of movement or new symptoms are reasons to stop the session and assess the patient medically. If re-assessment shows no improvement, the plan is reviewed individually; the protocol does not set a fixed number of sessions before review.

7. Decision algorithm

The algorithm rests on one principle: first identify the mechanism of asymmetry, then choose the level of correction. A toxin touch-up (level 2) is performed only by a physician. In the author's practice in Cyprus, the author applied level 1 only; any touch-ups were performed by the patients' treating physicians. The correspondence between mechanisms and levels is given in Table 4, and the sequence of decisions in Figure 2.

Table 4. Mechanisms of functional asymmetry after botulinum toxin treatment and level of correction

Mechanism	Clinical signs	Level 1: manual correction	Level 2: toxin touch-up*	Sources
M1. Reduced recruitment of a zone	The muscle contributes less to movement than on the other side or before treatment; delayed onset of movement	Activation: short, dosed stimuli; control movement after each block	Not indicated: toxin does not correct weakness	[4, 5]
M2. Compensatory hyperactivity of unaffected muscles	Movement "migrates" to a neighboring zone; tension on palpation	Offloading	Small dose to the hyperactive segment if compensation is marked and persistent	[17, 18]
M3. Residual activity of an undertreated segment	A local segment works at full strength (e.g., lateral frontalis)	Offloading: partial effect	Main option: small dose to that segment	[13, 16, 20]
M4. Uneven bilateral effect	One side more strongly blocked; asymmetric smile or brows	Restoring the baseline movement pattern of both sides	Defer additional injections until re-assessment	[4, 18, 19]
M5. Pre-existing asymmetry unmasked	Asymmetry visible on pre-treatment photographs or at rest	Offloading of compensatory zones; target is the individual baseline pattern; patient counseling	Case by case	[19]
Red flags	Eyelid ptosis, diplopia, marked impairment of speech, swallowing or eye closure	Not applied to this component	Medical assessment and treatment	[21]

∗Only when the parameters of the primary injection (product, dose, sites) are known. Patients treated elsewhere whose injection parameters are unknown receive manual correction only: an additional dose against an unknown cumulative dose raises the risk of immunogenicity [23] and makes the result unpredictable.

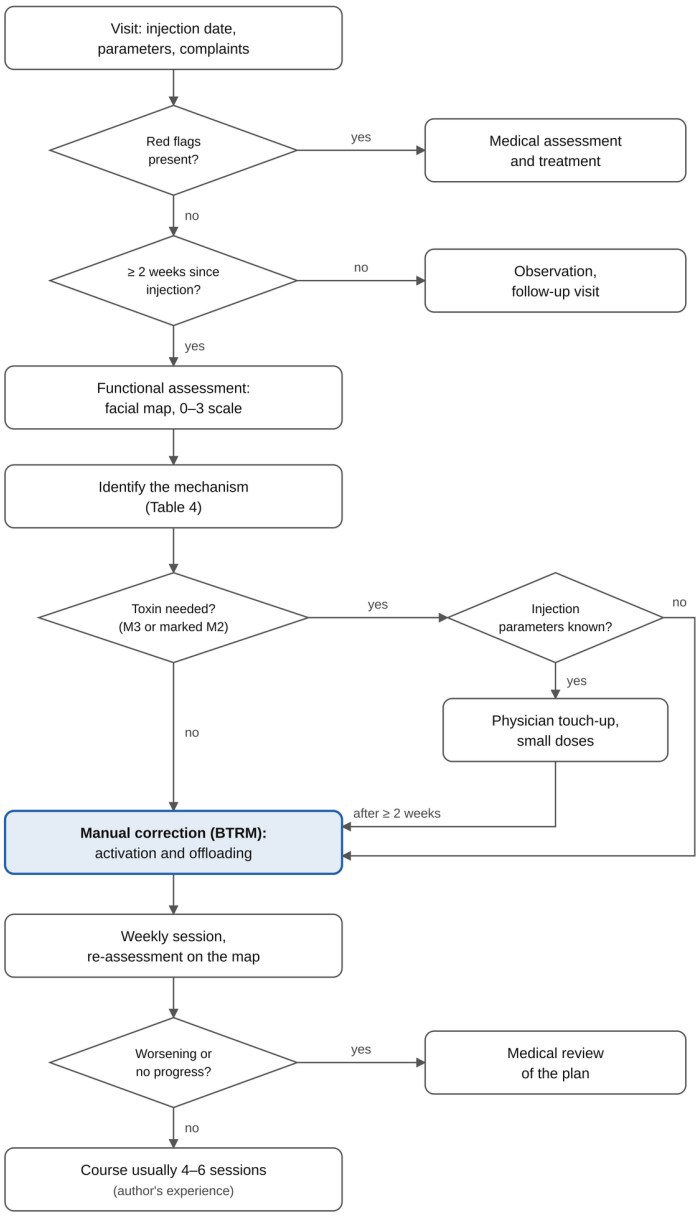


Figure 2. Decision algorithm for functional asymmetry after botulinum toxin treatment (author's schematic)

A toxin touch-up is possible only when the parameters of the primary injection are known; every other branch leads to manual correction or medical assessment.

7.1. Clinical assessment before choosing a level

The algorithm can be applied only after the mechanism has been identified, and this is done at the first visit by combining four sources of information.

7.1.1. History

Date of the last injection and of any touch-up; product, dose and injection sites, if known; earlier treatments and any asymmetry the patient noticed before them; time of onset and course of the complaint. Onset within the first two weeks after injection is compatible with toxin action, whereas an asymmetry that predates treatment points to M5.

7.1.2. Rest and standardized expressions

The face is examined at rest and during a fixed set of movements. eFACE grades static, dynamic and synkinesis parameters [31], and the voluntary movement component of the Sunnybrook Facial Grading System uses five standard expressions: brow elevation, gentle eye closure, open-mouth smile, snarl and lip pucker [32]. Both scales were developed for facial nerve palsy and have not been validated after aesthetic treatment. Their standard expressions are nevertheless a practical way to record which regions move less (M1, M4), which segments keep full excursion (M3) and where movement shifts to a neighboring region (M2). Video is preferable to still photographs, because delayed onset and the migration of movement to another zone are dynamic findings.

7.1.3. Palpation during contraction

Palpation helps to distinguish a muscle that is weak from one that is overactive and tense. This distinction determines whether a zone receives activation or offloading.

7.1.4. Comparison with the baseline

Pre-treatment photographs, when available, define the target of correction. When they are not, the patient's account and earlier personal photographs are used, and the uncertainty is recorded.

The patient's perspective completes the assessment. FACE-Q is a set of validated patient-reported scales for facial aesthetic treatment that includes satisfaction with the outcome [33]. It has not been validated for asymmetry after botulinum treatment, but it is a reasonable secondary outcome for the study proposed in Section 8.3.

The same tests are repeated after each session and at the end of the course. The decision to continue, to change the plan or to move to level 2 then rests on documented change rather than on general impression.

7.2. Case scenarios: the perioral region

Among the 15 patients managed in 2023–2025 (Section 2), two scenarios of perioral asymmetry predominated. They are described in generalized form, without data on individual patients and without quantitative assessment.

7.2.1. Scenario A: restricted, flattened smile

The lips are stiff, and an attempt to smile moves mainly the chin. This combines mechanisms M1 and M2: reduced recruitment of the orbicularis oris with compensatory hyperactivity of the mentalis. Management: activation of the perioral zone and offloading of the chin.

Scenario B: smile more pronounced on one side. Mechanism M4. The author worked on both sides, aiming to restore the patient's own baseline smile as far as possible rather than matching one side to the other.

In both scenarios sessions were held once a week. In the author's clinical judgment, most patients showed a

noticeable recovery of range of movement after 4–6 sessions. This is an observation, not a measured outcome: without a comparison group, the effect of the method cannot be separated from natural recovery (Section 8.2).

8. Discussion

The proposed algorithm changes the logic of managing asymmetry: correction is chosen by mechanism rather than by the mere presence of a defect. Published toxin-based corrections - lowering the opposite brow [19] or injecting the hyperactive muscle on the opposite side [18] - already target the dominant side and thus implicitly acknowledge the role of compensation. Manual offloading offers a non-pharmacological alternative built on the same logic, while activation is a tool for zones where toxin cannot help in principle.

The facial palsy literature provides a useful parallel. There, botulinum toxin and functional retraining are increasingly used together, and the sequence matters: rehabilitation performed after toxin injection yielded better results than rehabilitation alone [28]. The BTRM algorithm follows a similar sequence - touch-up first, manual work afterwards - but in an aesthetic population with transient, pharmacologically induced imbalance rather than permanent nerve injury. The analogy supports the principle, not the transfer of effect sizes.

The available trial of facial massage illustrates why the direction of manual work matters. In healthy women, gua sha massage reduced the tone and stiffness of facial muscles, whereas a facial roller mainly changed skin elasticity [29]. A tone-reducing effect of this kind is what BTRM seeks in compensatory zones, but it is the opposite of what is needed in a zone already weakened by the toxin. Conventional relaxing massage applied uniformly to the whole face after botulinum treatment may therefore be neutral at best for the weakened side. Separating activation from offloading by zone is the main conceptual difference between BTRM and conventional facial massage. Whether this difference translates into a clinical benefit has yet to be tested.

The algorithm also has practical implications beyond the choice of technique. Asking at the first visit whether the injection parameters are known determines which options are available. Explaining to the patient that the goal is their own baseline pattern rather than perfect symmetry sets realistic expectations, particularly when asymmetry predated treatment [19]. Standardized documentation of each session makes outcomes comparable and supports any future evaluation [30].

8.1. Possible mechanisms of action (hypotheses)

The mechanism of BTRM has not been studied. Activating stimulation cannot restore transmission at blocked synapses [11, 12]. Plausible targets that require testing are:

- fibers at the margin of the toxin's field of action that are only partly blocked;
- motor control and coordination - sensory cueing and reduced excess activity of neighboring muscles, by analogy with neuromuscular retraining [25–27];
- soft tissues and fascial connections, consistent with the measurable effect of manual techniques on facial muscle tone [29].

A separate hypothesis is that starting with the manual level may reduce the number of additional injections and hence the cumulative dose - an established risk factor for secondary non-response [23, 24].

8.2. Limitations

- No prospective data and no comparison group. The author's experience covers 15 patients over three years and was not documented according to a standardized protocol.
- Overlap with natural recovery. Patients presented 1–2 months after injection and courses lasted 4–6 weeks, ending roughly 2.5–3.5 months after injection. Natural recovery of function is already under way during this period [12], and some asymmetries resolve on their own [3, 19].
- Subjective assessment. The 0–3 scale has not been validated. Available validated instruments (eFACE, Sunnybrook) were developed for facial nerve palsy [31, 32].
- Single author who developed the method - a possible source of bias in judging outcomes.
- Narrative design of the review - relevant studies may have been missed.
- Selected case mix. Most patients in the author's practice had perioral asymmetry and had been treated by other practitioners. Experience with forehead and periorbital patterns is more limited, and the algorithm has not been checked against a consecutive series of patients.
- Operator dependence. Manual techniques depend on the practitioner's skill, and the maneuvers are described in detail only in a Russian-language manual [5]. Reproducibility by other clinicians has not been assessed.
- No long-term follow-up. Whether the pattern of expression achieved by the end of a course persists, or influences the response to the next injection, is unknown.

8.3. Proposed validation design

The key question is whether BTRM speeds the recovery of symmetry compared with the natural course. Only a comparative study can answer it (Table 5).

Table 5. Proposed randomized study of BTRM (PICO structure)

Element	Proposal
Population (P)	Adults with functional asymmetry after aesthetic BoNT-A treatment, at least 2 weeks after injection, without red flags
Intervention (I)	BTRM once a week, fixed number of sessions
Comparison (C)	Observation with the same visit schedule
Outcomes (O)	Primary: change in symmetry of movement on standardized video, rated by independent assessors blinded to group. Secondary: eFACE dynamic parameters [31], patient satisfaction (FACE-Q satisfaction with outcome [33]), need for touch-up, time to subjective resolution
Stratification	Time since injection; facial region
Ethics	Ethics committee approval, written informed consent, prospective trial registration

Sample size should be calculated from pilot data. Stratification by time since injection is essential precisely to separate the effect of the method from natural recovery.

Practical details of the design deserve attention. Video should be recorded at rest and during the standard expressions with a fixed camera position, lighting and instructions at baseline, after each session, at the end

of the course and at a follow-up visit about three months after the primary injection. Assessors should rate randomly ordered recordings without knowledge of group or visit number. Patients with unknown injection parameters should not be excluded, because they represent an important part of real-world practice, but the injection history should be recorded as a stratification or adjustment variable. A small pilot study would establish recruitment, the acceptability of a no-treatment comparison and the variance of the primary outcome.

8.4. Implications for practice

Several practical conclusions follow from the mechanisms reviewed, independently of whether BTRM proves effective.

8.4.1. Baseline documentation

Distinguishing unmasked pre-existing asymmetry (M5) from treatment-induced asymmetry is only possible if the baseline is known. Pre-treatment assessment should include brow position and any existing asymmetry [19], and comprehensive pre-assessment of the core facial expressions has been advocated in recent technique papers [10]. Standardized photographs or video at rest and during standard expressions, taken before the first injection, are the simplest safeguard against misattributing a pre-existing pattern to the treatment.

8.4.2. Conservative dosing and planned review

Uncertainty about the patient's anatomy argues for conservative doses and reassessment of the need for additional units at a scheduled review [19]. A review visit at about two weeks coincides with the peak of effect [10] and is also the earliest point at which the algorithm proposed here can be applied.

8.4.3. Continuity of information between practitioners

Many patients with asymmetry are seen by a physician other than the one who treated them. Because a touch-up is reserved for patients whose injection parameters are known, a written record of product, dose and injection sites given to every patient widens the options available later. Without it, the safest course is manual correction and observation rather than an additional dose against an unknown cumulative exposure [23, 24].

8.4.4. Training and quality control

A method that relies on reading functional patterns requires sound knowledge of mimetic muscle anatomy and its variants [13–16]. Where the method is taught to other practitioners, a standardized assessment form and session record are needed both for quality control [30] and for collecting the data that a future evaluation will require.

9. Conclusions

Functional asymmetry after aesthetic BoNT-A treatment arises from several mechanisms, an important share of which is secondary redistribution of muscle activity. The proposed algorithm links each mechanism to a level of correction:

- manual activation for under-recruited zones, where toxin cannot help;
- manual offloading for compensatory zones;

- toxin touch-up for residual activity of a muscle segment, and only when the parameters of the primary injection are known.

BTRM is applied no earlier than 2 weeks after injection and does not replace medical assessment when red flags are present. Its effectiveness has not been established; this requires a study with a comparison group and blinded outcome assessment, the design of which is proposed here.

Declarations

Author contributions (CRediT). A. Yakovidi-Koneva: conceptualization, methodology, development of the method, literature review, writing – original draft, writing – review and editing.

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Conflicts of interest. The author is the developer of the BTRM method and the author of the methodological manual describing it [5]. The author receives no income from the manual, which was prepared for scientific purposes, and does not provide paid training in the method.

Ethics approval and informed consent. Not applicable. This narrative review is based on published literature and on the author's methodological manual. It contains no data on identifiable individuals, no patient images and no results of research involving human participants; the author's clinical experience is summarized in generalized, non-identifiable form. Approval by an ethics committee and patient consent for publication were therefore not required.

Data availability statement. No new data were generated or analyzed in this study. The methodological manual describing the BTRM method [5] is published as a book (ISBN 978-5-0070-9878-6).

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