

Facial Aesthetics and Botulinum Toxin in Dentistry: The New Cosmetic Era of Non-Surgical Aesthetics

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Abstract

Objective: The face has become as central to modern dental practice as the smile it frames, and botulinum toxin type A (BoNT-A) now sits at the centre of a rapidly expanding, non-surgical cosmetic discipline within dentistry. This narrative review examines the pharmacological basis, clinical applications, technique principles and safety profile of BoNT-A as used by dentists for both facial aesthetic enhancement and orofacial therapeutic indications, and considers the professional, educational and regulatory dimensions of this emerging scope of practice. **Methodology:** A narrative literature review was conducted using PubMed, Scopus and Google Scholar, focusing on peer-reviewed articles, systematic reviews and clinical reports concerning botulinum toxin use in dentistry, facial aesthetics and orofacial medicine, published predominantly between 1992 and 2025. Search terms included combinations of "botulinum toxin", "facial aesthetics", "cosmetic dentistry", "gummy smile", "masseter hypertrophy", "bruxism" and "orofacial harmonization". **Major Findings:** BoNT-A acts by cleaving SNAP-25 within the presynaptic SNARE complex, blocking acetylcholine release and producing temporary, reversible muscle relaxation. In dentistry this mechanism is exploited both cosmetically, to soften hyperkinetic facial lines and correct gummy smiles, and therapeutically, to manage bruxism, masseteric hypertrophy, myofascial temporomandibular pain and related orofacial hyperactivity disorders. Reported complication rates are low, and most adverse events are transient, provided treatment is anchored in sound anatomical knowledge and structured training. **Conclusion:** Botulinum toxin represents a natural and evidence-supported extension of the dentist's existing anatomical expertise and injection skill, but its safe integration into dental practice depends on rigorous undergraduate and postgraduate education, clear scope-of-practice regulation, and adherence to informed-consent and safety standards comparable to those in medical aesthetic practice.

Keywords:

Botulinum Toxin Type A; Facial Aesthetics; Cosmetic Dentistry; Orofacial Harmonization; Gummy Smile; Masseter Hypertrophy.

Introduction

Over the past three decades, the global demand for minimally invasive facial rejuvenation has grown steadily across age groups and demographics, reshaping the boundaries of what patients expect from an aesthetic consultation ^[1]. Botulinum toxin type A (BoNT-A) remains the most frequently performed non-surgical cosmetic procedure worldwide, and its cosmetic story began, almost by accident, in ophthalmology. In the mid-1980s, Jean Carruthers observed that patients treated with BoNT-A for blepharospasm developed a softened, more relaxed glabellar region; working with her

dermatologist husband Alastair Carruthers, she went on to publish the first formal report of BoNT-A for glabellar frown lines in 1992 ^[2,3]. This single observation catalysed what is now a multi-billion-dollar global aesthetics industry and, more recently, a distinct sub-discipline within dentistry itself.

Dentistry has always been, at its core, a discipline of the face. Dentists are trained extensively in the anatomy of the maxillofacial region, in fine-motor injection technique, and in the aesthetic principles that govern a harmonious smile; it is this existing skill set that has allowed facial aesthetics, and BoNT-A in particular, to migrate naturally into general and cosmetic dental practice ^[4]. The concept of "orofacial harmonization" has emerged internationally to describe this convergence of dental, dermatological and plastic-surgical thinking, in which the smile is treated not as an isolated unit but as one element of overall facial balance ^[4,5].

Beyond its cosmetic role, BoNT-A has a well-established therapeutic footprint in orofacial medicine. Controlled clinical studies have demonstrated its efficacy in bruxism, masseteric hypertrophy, myofascial temporomandibular disorder (TMD) pain, and a range of hyperkinetic or dystonic orofacial conditions, placing it at the intersection of aesthetic and functional dental care ^[6,7]. This dual identity, cosmetic on one hand and therapeutic on the other, is precisely what distinguishes botulinum toxin's role in dentistry from its use in general aesthetic medicine, and is the central theme of this review.

The rationale for this review is threefold. First, the rapid expansion of dentist-administered BoNT-A treatment has outpaced the availability of structured, dentistry-specific literature synthesising the aesthetic and therapeutic evidence base. Second, ongoing debate persists internationally regarding whether, and to what extent, botulinum toxin injection falls within the defined scope of dental practice ^[8]. Third, patient safety in this expanding field depends on dentists possessing a sound understanding of facial anatomy, danger zones, dosing principles and complication management, knowledge gaps that recent surveys suggest are not yet uniformly present across the profession ^[1]. The objective of this review is therefore to synthesise current evidence on the pharmacology, clinical indications, technique and safety of BoNT-A in dentistry, and to critically discuss the professional, educational and regulatory considerations that accompany this new cosmetic era of non-surgical dental aesthetics.

Materials and Methods

This article is a narrative literature review; it did not involve human participants, patient data or animal subjects, and therefore no institutional ethical approval or informed consent was required. All cited studies had, where applicable, obtained their own ethical approvals and informed consent as reported in their original publications.

Search Strategy

A structured search of the electronic databases PubMed/MEDLINE, Scopus and Google Scholar was conducted for articles available up to September 2026, with the majority of retrieved literature concentrated in the period 2010–2026, supplemented by seminal historical publications dating back to 1992 where relevant to the origin of cosmetic botulinum toxin use ^[2,3]. Search terms were combined using Boolean operators and included: "botulinum toxin" AND "dentistry"; "botulinum toxin" AND "facial aesthetics"; "cosmetic dentistry" AND "botox"; "gummy smile" AND "botulinum toxin"; "masseter hypertrophy" AND "bruxism"; "orofacial harmonization"; and "botulinum toxin" AND "temporomandibular disorder".

Eligibility Criteria

Peer-reviewed original research, systematic reviews, narrative reviews, case series and authoritative clinical/professional commentary published in English were considered eligible where the content addressed the pharmacology, dental or facial aesthetic application, technique, safety, or scope-of-practice dimensions of botulinum toxin. Non-peer-reviewed promotional material, single case reports without generalisable findings, and sources unrelated to the orofacial region were excluded. Reference lists of retrieved articles were hand-searched to identify additional relevant sources.

Data Synthesis

Given the heterogeneity of study designs across the retrieved literature, ranging from randomised controlled trials to narrative reviews and expert commentary, a narrative rather than meta-analytic

synthesis was undertaken. Findings were organised thematically around mechanism of action, cosmetic indications, therapeutic/functional indications, technique and safety, and professional/educational considerations, which form the structure of the Results and Discussion section below.

Results and Discussion

Pharmacology and Mechanism of Action

Botulinum neurotoxin is produced by the anaerobic, gram-positive bacterium *Clostridium botulinum*. Of its seven serotypes (A–G), type A is the most clinically utilised owing to its potency and predictable duration of effect. The holotoxin consists of a heavy chain, which mediates high-affinity binding to and endocytosis by the presynaptic cholinergic nerve terminal, and a light chain, which acts intracellularly as a zinc-dependent endopeptidase^[10]. Once internalised, the light chain cleaves synaptosomal-associated protein of 25 kDa (SNAP-25), a core component of the SNARE (soluble N-ethylmaleimide-sensitive factor attachment protein receptor) complex responsible for docking and fusion of acetylcholine-containing vesicles with the presynaptic membrane^[10]. With SNAP-25 cleaved, vesicle fusion and acetylcholine release are blocked, producing a temporary, dose-dependent chemodenervation and flaccid paralysis of the injected muscle that typically lasts three to four months, until the nerve terminal forms new sprouts and the neuromuscular junction is remodelled^[10]. This same mechanism underlies both its cosmetic action, softening dynamic (expression-related) rhytids by reducing the amplitude of muscle contraction, and its therapeutic action, in disorders characterised by excessive or hyperactive muscular contraction such as bruxism and myofascial pain. Clinical use of botulinum toxin began in ophthalmology in the 1970s, culminating in approval for strabismus and blepharospasm by the end of the following decade^[3]. Jean and Alastair Carruthers' 1992 report of its incidental cosmetic benefit for glabellar frown lines opened the aesthetic era of botulinum toxin, and onabotulinumtoxinA subsequently received cosmetic approval for glabellar lines, later extended to crow's feet, forehead lines and platysmal bands^[2,3]. The subsequent migration of this technology into dentistry reflects both the anatomical overlap between the orofacial and maxillofacial regions that dentists already manage, and the natural extension of dentists' fine-motor injection expertise into the surrounding soft tissues of the face^[4].

Cosmetic Applications in Dentistry

Within the upper and middle face, BoNT-A is used by trained dentists to soften horizontal forehead lines, glabellar frown lines and periorbital "crow's feet", all of which arise from repeated contraction of the frontalis, corrugator supercilii, procerus and orbicularis oculi muscles. While these indications are shared with medical aesthetic practice generally, dentistry's distinctive contribution lies in the lower face and perioral region, where BoNT-A intersects directly with smile design and dentoalveolar aesthetics^[4].

The correction of the "gummy smile", or excessive gingival display, is among the most dentistry-relevant cosmetic applications of BoNT-A. Excessive gingival display is most commonly attributed to hyperfunction of the muscles that elevate the upper lip, principally the levator labii superioris, levator labii superioris alaeque nasi, and zygomaticus minor, although skeletal, dental eruption and soft-tissue factors may also contribute and must be differentiated during diagnosis^[11,13]. When the aetiology is primarily muscular, injection of small doses of BoNT-A into these elevator muscles reduces the upward excursion of the lip during smiling. Clinical series report a reduction in gingival display from a pre-treatment range of approximately 6–9 mm to around 1–2 mm within one to two weeks of injection, with high patient satisfaction and a conservative, reversible alternative to gingivectomy, lip repositioning surgery or orthognathic correction^[12]. A 2023 systematic review and meta-analysis confirmed that BoNT-A produces a statistically significant reduction in gingival display, although effects are temporary, typically lasting four to seven months, and recurrence should be discussed with patients as part of informed consent^[14]. A narrative review by Fatani similarly concluded that BoNT-A offers a simple, minimally invasive and well-tolerated option for lip-hyperfunction-related gummy smiles, while cautioning that careful patient selection is essential, since BoNT-A confers little benefit when the excessive display is primarily skeletal or dental in origin^[11].

BoNT-A is also used cosmetically to contour the lower face through reduction of masseteric hypertrophy, producing a softer, more oval jawline, a treatment goal that is particularly popular

among patients with a pronounced or square mandibular angle secondary to parafunctional muscle overuse^[9,7]. Because masseteric hypertrophy is frequently secondary to bruxism, this cosmetic indication overlaps substantially with the therapeutic indications discussed below, illustrating how, in dentistry more than in any other injecting discipline, aesthetic and functional treatment goals are often addressed by the same injection.

Therapeutic and Functional Applications in Orofacial Medicine

Beyond aesthetics, BoNT-A has an increasingly robust evidence base for functional orofacial disorders that dentists routinely manage. In bruxism and associated masseteric myalgia, injection of BoNT-A into the masseter and, where indicated, the anterior temporalis muscle produces reversible weakening that reduces both the force and frequency of parafunctional clenching and grinding^[7,15]. A retrospective analysis of 72 patients treated over an eleven-year period reported symptomatic relief in 91% of cases, with softening of the masseter and resolution of nocturnal bruxism, and roughly half of patients reporting durable relief without need for repeat treatment^[15]. A randomised controlled trial by Lee and colleagues similarly demonstrated reduced bruxism activity on nocturnal electromyography following BoNT-A injection compared with saline placebo^[18], while Al-Wayli's prospective randomised study found BoNT-A superior to conventional splint and pharmacological therapy for chronic pain associated with nocturnal bruxism at follow-up intervals extending to one year^[16].

In temporomandibular disorders, BoNT-A injection into the masseter and temporalis muscles has been used to manage myofascial pain refractory to conservative therapy, with several controlled trials reporting reductions in pain intensity and improved mandibular range of motion^[19]. A systematic review of orofacial applications spanning bruxism, TMJ dislocation, orofacial dystonia, myofascial pain, sialorrhea, Frey syndrome and orofacial spasm concluded that BoNT-A demonstrates good clinical evidence across most of these indications, although dosing, dilution and injection-site protocols remain variably standardised across the literature and warrant further consensus^[6]. Additional orofacial applications described in the literature include management of sialorrhea, gustatory sweating (Frey syndrome), oromandibular dystonia and selected orofacial neuropathic pain conditions, although evidence quality for the latter remains limited to a small number of controlled trials^[21,20].

This therapeutic dimension reframes BoNT-A, in the dental context, as more than a purely cosmetic adjunct: it functions as a conservative, reversible tool for managing muscular hyperactivity that would otherwise contribute to tooth wear, restorative failure, joint loading and chronic orofacial pain, indications that arguably fall squarely within the traditional scope of dental practice even before any cosmetic benefit is considered^[8,6].

Technique, Anatomy and Combination with Other Modalities

Safe and effective administration of BoNT-A requires a systematic understanding of the topographic relationships between facial musculature, the overlying skin layers, and the vascular and neural structures that traverse the injection field. Dentists' pre-existing training in maxillofacial anatomy provides a strong foundation, but facial aesthetic injection introduces anatomical zones, such as the temporal and periorbital vasculature, that are not routinely emphasised in standard dental curricula^[1]. A 2025 cross-sectional survey of 316 dentists administering BoNT-A found that although the majority had received some specialised training, only 37% had attended toxin-specific courses, and respondents identified persistent knowledge gaps in facial vascular anatomy, underscoring the need for structured, anatomy-focused continuing education before independent practice^[1].

In contemporary practice, BoNT-A is frequently combined with hyaluronic acid dermal fillers and, in some jurisdictions, adjunctive modalities such as microneedling, polydioxanone threads or platelet-rich fibrin, under the umbrella term "orofacial harmonization"^[4,5]. In this integrated model, BoNT-A relaxes hyperactive muscles governing lip and perioral movement while dermal fillers restore lost volume, together with restorative or orthodontic dentistry addressing the dentoalveolar component of the smile. Case reports combining orthodontic treatment of occlusal alteration with masseteric BoNT-A injection illustrate this multidisciplinary approach in the management of bruxism with concurrent aesthetic concerns^[17].

Safety, Complications and Contraindications

BoNT-A has an established safety profile across its aesthetic and therapeutic applications, with most adverse events being mild, transient and related either to injection technique or to diffusion of the toxin beyond the intended muscle. Clinical series and consensus reviews report overall complication rates in the low double digits, with headache, localised bruising or swelling, and transient neuromuscular symptoms such as ptosis or asymmetric smile being the most frequently observed events; severe complications are rare ^[1]. In the dental literature specifically, inadvertent diffusion into the risorius or zygomaticus muscles during masseteric or perioral injection has been described as a cause of temporary smile asymmetry, reinforcing the importance of precise dosing and injection depth ^[9].

Recognised contraindications include known hypersensitivity to botulinum toxin or any formulation constituent, active infection at the injection site, neuromuscular junction disorders such as myasthenia gravis or Lambert-Eaton syndrome, pregnancy and lactation (where safety data are insufficient), and concurrent use of medications, such as aminoglycoside antibiotics, that potentiate neuromuscular blockade. Careful pre-treatment assessment, standardised photographic documentation, and informed consent that addresses the temporary nature of results, the possibility of touch-up treatment, and the recognised complication profile are essential components of safe practice, mirroring standards already well established in general aesthetic medicine ^[1].

Professional, Educational and Regulatory Considerations

Whether botulinum toxin injection falls within the defined scope of dental practice remains a live professional debate in several jurisdictions. Regulatory and professional bodies have defined dentistry as encompassing the evaluation, diagnosis, prevention and treatment of diseases, disorders and conditions of the oral cavity, the craniomaxillofacial area and adjacent structures, and their impact on the human body, provided care is delivered within a dentist's education, training and experience ^[8]. Under this definition, therapeutic BoNT-A for bruxism, masseteric hypertrophy and TMD-related myofascial pain sits comfortably within scope, given its direct relevance to masticatory and occlusal health; purely cosmetic upper-face indications, such as glabellar or forehead lines, occupy more contested territory and are subject to differing regulatory positions internationally ^[8,22].

Survey data indicate that dentists already constitute a substantial proportion of practitioners administering facial cosmetic injectables, reflecting both patient trust and the profession's existing procedural and anatomical competence ^[22]. However, the same commentary highlights that the aesthetics injectables market as a whole remains inconsistently regulated across practitioner types, reinforcing the argument that formal, standardised training pathways, rather than informal short courses alone, should underpin any dentist's transition into this field ^[1,22].

Several authors have called for the deliberate integration of facial anatomy, BoNT-A pharmacology, and the medicolegal and ethical dimensions of cosmetic practice into dental curricula and structured postgraduate programmes, rather than leaving this education to disparate, commercially run weekend courses of variable quality ^[1,4]. Postgraduate qualifications and dedicated orofacial harmonization programmes have begun to emerge internationally in response to this need, combining theoretical instruction in facial anatomy, toxin and filler pharmacology, and supervised clinical practice ^[5]. For the individual practitioner, the message from the literature is consistent: cosmetic and therapeutic botulinum toxin use is a natural extension of dental training, but only when that extension is deliberately built through structured education, mentored clinical experience, and ongoing audit of outcomes and complications, rather than assumed on the basis of existing injection dexterity alone.

Conclusion

Botulinum toxin type A has moved from an ophthalmological curiosity to a central pillar of non-surgical facial aesthetics, and dentistry is now firmly established as one of its principal delivery settings. The evidence reviewed here supports BoNT-A as an effective, reversible and generally well-tolerated tool across a spectrum of applications that spans purely cosmetic upper-face rejuvenation, smile-focused indications such as gummy smile correction, and therapeutic management of bruxism, masseteric hypertrophy and myofascial temporomandibular pain. This dual cosmetic-therapeutic identity is what most clearly distinguishes botulinum toxin's role in dental practice from its use in

other aesthetic disciplines, and arguably strengthens the case for its inclusion within the dentist's clinical repertoire.

At the same time, the literature is consistent in cautioning that competence in facial injection does not follow automatically from dental training alone. Safe practice depends on structured education in facial vascular and muscular anatomy, standardised dosing and technique, rigorous informed consent, and a clear-eyed understanding of the regulatory and scope-of-practice boundaries that differ between jurisdictions. As demand for non-surgical facial aesthetics continues to grow, dental education, regulation and continuing professional development will need to evolve in parallel, ensuring that this genuinely new cosmetic era in dentistry is built on a foundation of anatomical rigour and patient safety rather than on procedural popularity alone.

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Conflict of Interest

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