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Review Article

Intradermal botulinum toxin type A for enlarged facial pores and sebum control: A focused narrative review with practical injection considerations

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Abstract

Enlarged facial pores and excessive sebum secretion are frequent cosmetic problems that affect skin quality and patient confidence. Although intradermal botulinum toxin type A (BoNT-A) has shown promising results for sebum control and pore improvement, current evidence remains heterogeneous in terms of dose, dilution, injection technique, and outcome assessment. The objective of the study is to review and summarize current clinical evidence and mechanistic findings on the efficacy and safety of intradermal BoNT-A in reducing excessive sebum secretion and improving enlarged facial pores. This narrative review was performed using PubMed, Embase, Scopus, and Google Scholar. Studies published from January 2000 through 31 December 2025 were examined, including randomized controlled trials, split-face studies, prospective cohorts, and mechanistic reports. Only English-language publications were included. According to the reviewed studies, intradermal BoNT-A consistently reduced sebum secretion by approximately 30–75% and improved visible pore size. Outcomes of treatment were typically seen within 1–2 weeks and lasted 2–4 months. Skin texture improvement and patient satisfaction were also reported. Following a well-tolerated treatment, adverse effects were mild and transient, such as erythema, edema, and bruising, with rare cases of facial weakness. Intradermal BoNT-A could be a promising adjunctive treatment for excessive sebum secretion and enlarged facial pores. However, larger randomized studies with standardized treatment protocols and longer follow-up are recommended to confirm its long-term efficacy and safety profile.

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Introduction

Enlarged facial pores and excessive sebum production represent one of the most common cosmetic concerns that significantly affect skin appearance and individuals' self-esteem**.**

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According to population-based studies, visible pore enlargement affects approximately 35-45% of adults, with higher prevalence reported among Asian populations compared with Caucasians.

Particularly, differences in skin texture, sebaceous gland activity, and environmental factors have been shown to contribute to these variations.[1,2] In the meantime, seborrhea is frequently observed among individuals with oily or acne-prone skin, and also viewed as a key factor in acne development and other conditions related to sebaceous dysfunction.[1,3]

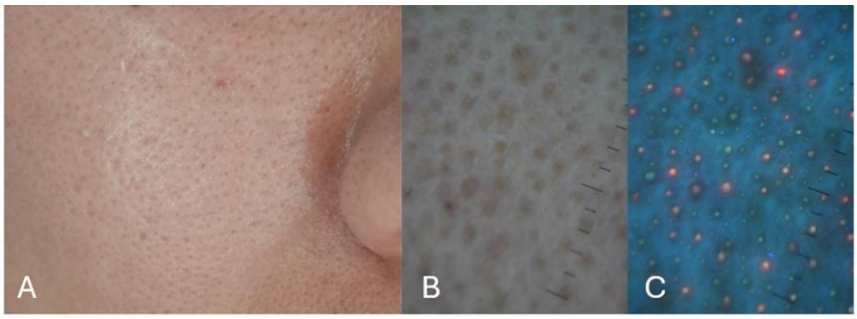


Figure 1 Clinical and dermoscopic evaluation of facial pore enlargement. (A) Standard clinical image of the malar area illustrating prominent dilated follicular openings and uneven skin texture (B) Polarized dermoscopic view (DermLite DL5, ×10 magnification) showing enlarged follicular openings with perifollicular pigmentation and keratin plugs (C) Ultraviolet imaging revealing orange-red follicular fluorescence, consistent with porphyrin activity produced by Cutibacterium acnes (formerly Propionibacterium acnes).

Likewise, previous studies have shown significant associations between sebum production, pore enlargement, and overall skin quality, including the aesthetic and psychosocial implications of these conditions **(Figure 1)**.[4-6]

Conventional treatments, such as retinoids and niacinamide, aim to control sebaceous activity and reduce oil secretion. Meanwhile, certain interventions such as chemical peels, fractional lasers, and radiofrequency devices are commonly used to improve skin texture and reduce pore visibility.[4,7,8] Nonetheless, inconsistent treatment outcomes are often reported and adverse effects such as redness, irritation, and downtime can limit patient satisfaction and adherence.[7,9]

Botulinum toxin type A (BoNT-A), a neurotoxin traditionally used for treatment of neuromuscular disorders and aesthetic wrinkle reduction, has recently been explored for its potential effects on skin appearance when administered intradermally.[10-12]

Experimental and clinical studies suggest that BoNT-A may reduce sebum secretion with distinct mechanisms from its muscle-relaxing actions.[11] Meanwhile, the use of intradermal BoNT-A which often referred to as microbotox or mesobotox has been proposed as a potential treatment for enlarged pores and facial seborrhea.[13,14] However, there is relatively limited evidence and substantial variations across studies on injection techniques, dosing regimens, outcome measures, and follow-up duration. Thus, the clinical benefits and long-term safety profile of BoNT-A need to be fully investigated.[13,14]

This narrative review aims to summarize current evidence on the efficacy and safety of intradermal BoNT-A for facial pore size and sebum reduction, to describe the biological mechanisms of these effects, and to discuss its potential implications as a supportive therapy in aesthetic dermatology.

Methods

A structured literature search was conducted in PubMed, Embase, Scopus, and Google Scholar for studies published during 2000–2025 using both MeSH terms and free-text keywords related to BoNT-A, sebum, and pore size. Eligible studies included randomized controlled trials, split-face studies, cohort investigations, case series, and mechanistic reports. Titles and abstracts were screened, and full texts were reviewed for relevance. Data were grouped into categories: sebum reduction, pore size improvement, injection technique, and mechanistic evidence. Due to differences in study design and outcome reporting, results were narratively summarized rather than statistically pooled. The process of study identification and selection is shown in **Figure 2**.

Results

Mechanisms of Action The classical mechanism of botulinum toxin type A (BoNT-A) is the inhibition of acetylcholine (ACh) release at the neuromuscular junction through cleavage of the SNAP-25 protein within the SNARE complex. This blockage prevents vesicular fusion and neurotransmitter release, thus leading to temporary muscle relaxation.[15,16]

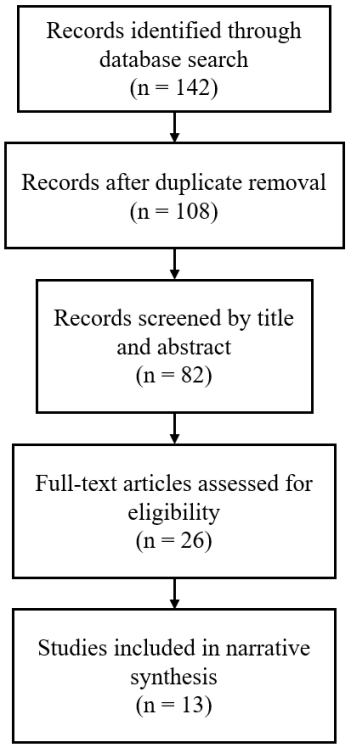


Figure 2 Literature search and study selection process. A structured search of electronic databases (PubMed, Embase, Scopus, and Google Scholar) identified 142 records. After duplicate removal, 108 records remained and were screened by title and abstract, resulting in 26 articles assessed for full-text eligibility. Ultimately, 13 studies were included in the narrative review.

Although this mechanism accounts for the established therapeutic applications of BoNT-A in conditions such as spasticity and wrinkle reduction, recent evidence suggests broader biological effects beyond skeletal muscle.

Recent studies show that sebaceous glands are innervated by cholinergic fibers and express muscarinic ACh receptors. ACh stimulates sebocyte proliferation and lipid production, highlighting its role in sebaceous activity. By inhibiting the release of ACh at perifollicular nerve endings, BoNT-A may reduce sebocyte function and thus lower sebum secretion.[17,18]

Supportive evidence derives from both in vitro and animal studies. In cultured sebocytes, exposure to BoNT-A reduced lipogenesis and decreased the expression of enzymes involved in fatty acid synthesis. Animal models also confirmed a decrease in sebaceous gland activity after intradermal BoNT-A administration. Clinically, these findings are associated with reductions in sebum excretion, often measured with a Sebumeter®.[11,18]

The reduction in pore size is likely explained by several mechanisms. Lower sebum output reduces follicular distension, thereby diminishing the visibility of enlarged pores. Also, BoNT-A may affect the arrector pili muscle, leading to relaxation and less traction on the follicular openings. Furthermore, emerging evidence indicates secondary effects such as improved extracellular matrix stability and reduced low-grade perifollicular inflammation, which contribute to smoother skin texture and smaller pore size. Additionally, histological studies have demonstrated a reduction in sebaceous gland size after BoNT-A treatment, supporting its direct structural effect on the pilosebaceous unit.[19]

The proposed mechanisms of BoNT-A in reducing sebum production and pore size are illustrated in **Figure 3**. Inhibition of acetylcholine release decreases sebaceous gland activity, while relaxation of the arrector pili muscle alleviates follicular

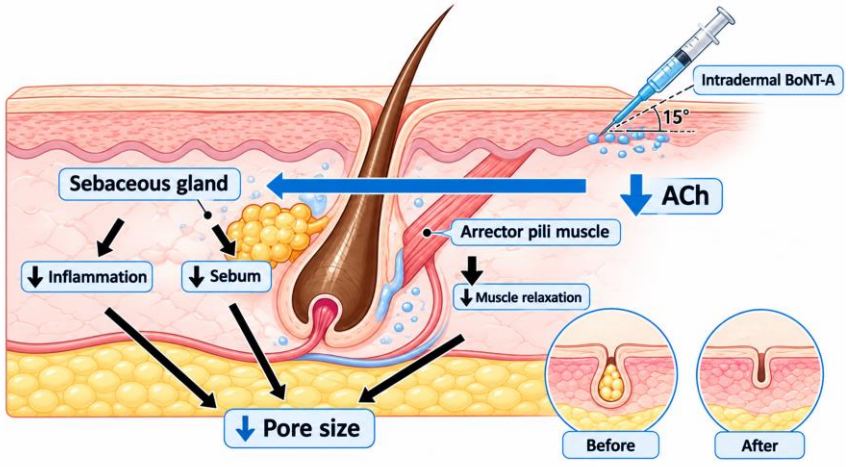


Figure 3 Proposed mechanisms of intradermal botulinum toxin type A (BoNT-A) in reducing sebum production and facial pore size

tension, collectively resulting in smaller pores and improved skin quality.

Taken together, these findings provide a clear molecular and physiological basis for the clinical observation that intradermal BoNT-A injections can improve sebum control and visibly reduce pore size.

In Figure 3; the schematic illustration proposed mechanisms by which intradermal BoNT-A may reduce sebum production and pore size. Inhibition of acetylcholine (ACh) release at perifollicular nerve endings may reduce cholinergic stimulation of sebaceous glands, leading to decreased sebum production. BoNT-A may also induce relaxation of the arrector pili muscle, thereby reducing traction on follicular openings. These effects, together with reduced perifollicular inflammation, may contribute to decreased pore visibility and improved skin texture.

The main characteristics, interventions, and outcomes of the reviewed clinical studies are summarized in **Table 1**.

a. Sebum Control Evidence for the effect of BoNT-A on sebaceous activity has been reported across controlled and uncontrolled trials. In a split-face pilot study, Sayed *et al*.[20] reported short-term reductions in sebum output and pore scores on both BoNT-A–treated and saline-injected sides at one month, suggesting a possible effect from needling. However, by four months, only the BoNT-A side maintained significant improvements, confirming its superior durability.

El Attar *et al*.[13] conducted a prospective single-arm study in 35 patients. It was found that intradermal botulinum toxin (20 U/mL dilution) could visibly improve oiliness within one week, with 82% showing marked improvement. Benefits generally lasted three to six months, and up to seven months in some cases.

In contrast, Shin *et al*.[21] reported no significant change in Sebumeter® values after intradermal botulinum toxin A injections in 15 volunteers, despite improvements in wrinkles and skin texture. This negative outcome suggests the importance of dose, dilution, and injection technique.

Rahman *et al*.[22] conducted a meta-analysis of 10 clinical studies (n=153). It was confirmed that BoNT-A significantly reduced sebum secretion (SMD −1.07, *P*=.03). However, heterogeneity was high (I^2 >80%) and the required information size was not obtained. While promising, the evidence remains preliminary.

b. Pore Size Improvement Pore size reduction has been one of the most consistently observed outcomes after BoNT-A treatment. In a prospective single-arm cohort of 35 patients, El Attar *et al*.[13] showed that 82% significantly achieved pore reduction, with high satisfaction scores (mean 4.7/5). Improvements typically lasted 3–6 months and up to seven months in some cases.

Pazyar *et al*.[23] conducted a randomized split-face trial in 20 patients and observed significant decreases in pore diameter on the BoNT-A–treated side compared with saline, with effects persisting up to three months. Similarly, Iraji *et al*. compared intradermal versus microneedling-assisted BoNT-A delivery in 30 patients.[30] The results showed that both techniques yielded equal efficacy in one month, suggesting flexibility in administration techniques.

Vachiramon *et al*.[24] further stratified outcomes by skin type in a randomized split-face trial of 32 patients. BoNT-A monotherapy achieved greater pore reduction in oily skin, whereas combination with crosslinked HA filler yielded superior results in non-oily skin, despite higher rates of papules and edema. Yang *et al*.[25] also demonstrated that BoNT-A combined with non-crosslinked HA improved pore scores and texture over four months, though without a monotherapy comparator.

On the contrary, Shin *et al*.[21] reported only transient improvement at two weeks, with no sustained benefit over eight weeks, suggesting the importance of dose, formulation, and technique in determining outcomes.

Table 1 Summary of Clinical and Technical Characteristics of Intradermal Botulinum Toxin A for Sebum Control and Pore Size Improvement.

Author, Year/ Country	*Design*	*N / Population*	*Toxin (Brand)*	*Dose / Dilution*	*Technique & Device*	*Depth / Spacing*	*Comparator*	*Outcomes*	*Main Results*	*Safety*	*Limitations*	*Funding*
Sayed 2021/ Egypt [20]	Split-face pilot	20 (seborrhea, pores)	BoNT-A (Refinex®)	10 U/side (20 U/mL)	Intradermal microdroplet, 30G	Superficial dermis, 1 cm grid	Saline	Sebum, pores, OCT	Both improved; BoNT-A sustained to 4 mo	No major AE	Placebo/needle effect	None
Shin 2022/ Korea [21]	RCT split-face	15 volunteers	IncoBoNT-A (Coretox®)	≤20 U/cheek (~20 U/mL)	Intradermal microdroplet	Subepidermal wheal, 1 cm	Saline	Sebumeter, pores, texture	Transient pore ↓ (2 wks); no sebum change	1 transient facial palsy	Small N, short f/u	Industry
El Attar 2020/ Egypt [13]	Prospective	35 (oily, pores)	OnaBoNT-A (Botox®)	20 U/mL	Microbotox bleb, 30G	Superficial dermis, 1 cm grid	None	Dermoscopy, GAIS	87% improved; 3–6 mo effect	Mild erythema	No control	None
Shirshakova 2021/ Russia [29]	Prospective	12 (acne, oily)	Mixed BoNT-A	0.125–0.25 U/site	Serial intradermal	Intradermal	None	Sebum, pores	Sebum ↓, pore ↓, texture ↑	No serious AE	Very small N	None
Pazyar 2024/ Iran [23]	RCT split-face	20 (pores)	BoNT-A (Masport®)	~50 U/mL	Intradermal, 30G	Intradermal, ~1 cm	Saline	OCT, dermoscopy	Significant pore ↓ (2 wks–3 mo)	No severe AE	No sebum data	Academic
Iraji 2025/ Iran [30]	RCT split-face	30 (pores)	BoNT-A	20 U/mL	Intradermal vs. MN-assisted	Intradermal vs. 3–3.5 mm MN	Contralateral	Pore grading	Both ↓; no difference	Mild erythema	Short f/u	None
Vachiramon 2025/ Thailand [24]	Randomized split-face	32 (pores)	OnaBoNT-A (Botox®)	5 U diluted	Microdroplet ± HA	Superficial dermis	BoNT-A+HA	Antera 3D, VISIA	Both ↓; oily → BoNT-A better; non-oily → combo better	Papules in HA	Small N	Industry
Yang 2025/China [25]	Retrospective	40 acne + pores	BoNT-A (Hengli®)	30–50 U + HA	Mesotherapy injector	0.8–1 mm dermis	None	VISIA, GAIS	Significant ↓ pores (1–4 mo)	Mild AE	No monotherapy arm	None

Overall, most studies consistently support BoNT-A as effective in reducing pore size with effects lasting three to six months, though durability and magnitude vary.

c. Combination Therapy Combination approaches with BoNT-A and hyaluronic acid (HA) fillers have been investigated for potential synergistic skin-quality improvements. Yang *et al*.[25] reported that BoNT-A combined with non-crosslinked HA via mesotherapy improved pore scores, texture, and porphyrin levels at one and four months, with GAIS effectiveness of 95% at one month and 87.5% at four months. Patient satisfaction was high, and adverse events were mild and transient.

Conversely, Vachiramon *et al*.[24] demonstrated that BoNT-A monotherapy provided better outcomes in oily skin, while the addition of crosslinked HA filler yielded greater improvements in non-oily skin types. However, this benefit led to increased risk, as more than half of patients developed papules, some lasting up to six months. These findings suggest that combination therapy may optimize textural outcomes, but safety concerns limit its widespread application. Careful patient selection, particularly with respect to skin type and tolerance for adverse effects, is therefore critical.

d. Systematic Evidence Rahman *et al*.[22] performed the first meta-analysis, pooling data from 10 studies (n=153). There were significant reductions in both sebum production (SMD −1.07) and pore size (SMD −2.34), together with improved skin texture. However, high heterogeneity and limited sample sizes reduced confidence in the findings.

Reviews, mechanistic studies, and expert consensus are summarized in **Table 2**.

Narrative reviews by Dayel *et al*.[26] reported reductions in sebum secretion (50-75%), pore size, and acne lesion counts. Meanwhile, Hanna *et al*.[27] also noted improvements in sebum control, pore size, erythema, and rosacea. Both reviews highlighted the need for standardized injection protocols, longer follow-up periods, and large-scale randomized controlled trials to validate efficacy and safety.

e. Mechanistic Insights Mechanistic studies provide the observed clinical outcomes with BoNT-A. Brami-Cherrier *et al*.[11] demonstrated in vitro and animal models that BoNT-A inhibits ACh-mediated stimulation of sebocytes, thus reducing lipid synthesis through suppression of the ERK/mTOR pathway and lowering perifollicular inflammation by decreasing substance P and NF-κB activity. These molecular changes associate with reductions in sebum production and inflammation in vivo.

Expert consensus further supports these mechanisms. Based on clinical experience in more than 5000 cases, Fabi *et al*.[28] described the intradermal botulinum toxin technique, recommending high-dilution intradermal microdroplet injections (20–28 U/mL) across the full face to achieve consistent improvements in pore size

Table 2 Systemic and Narrative Reviews, Mechanistic Studies, and Expert Consensus on BoNT-A.

Author, Year	*Type*	*Key Focus*	*Main Findings*	*Limitations*
Rahman 2024 [22]	Systematic review & meta-analysis (10 studies, 153 pts)	Sebum, pore, skin quality	↓ sebum (SMD −1.07), ↓ pores (SMD −2.34), improved skin texture; mild AE	High heterogeneity; small N; RIS not reached
Dayel 2024 [26]	Narrative review	6 studies (clinical & animal)	BoNT-A ↓ sebum 50–75%, ↓ pore size, improved acne; high satisfaction	Short f/u; small studies; publication bias
Hanna 2022 [27]	Narrative/systematic-style review	Oily skin, rosacea, pores	Multiple studies show ↓ sebum/pore, improved erythema & texture	Heterogeneity; non-standardized outcomes
Brami-Cherrier 2022 [11]	Mechanistic review (cell/animal)	Sebocyte cholinergic signaling	BoNT-A reduced oleic acid–induced lipogenesis via a non-classical, SNAP-25-independent mechanism	Preclinical data; limited human validation
Fabi 2023 [28]	Expert consensus (>5000 cases)	Clinical practice guidance	"Microtoxin" technique improves pore, sebum, acne, texture; recommends dilution 20–28 U/mL, superficial dermis	Opinion-based; no RCT; conflict of interest

sebum control, and overall skin quality. Supporting evidence from smaller uncontrolled studies, such as Shirshakova *et al*.[29] also reported short-term improvements in sebum, pores, and hydration within two weeks, despite study design limitations that constrain the strength of these findings.

f. Injection Technique and Safety Considerations

Across the reviewed studies, intradermal BoNT-A was administered using different techniques, while several consistent patterns were observed. The commonly reported intradermal microdroplet injection pattern is shown in **Figure 4**, illustrating a grid-based distribution across pore-dense facial areas. Most investigators used high-dilution preparations of 20–40 U/mL, injected as superficial intradermal microdroplets or micro blebs at approximately 1-cm intervals. Fine-gauge needles, typically 30G syringes, were the most frequently reported devices, although mesotherapy injectors and microneedling-assisted injection were also utilized in some studies. The target plane was generally the superficial dermis or subepidermal layer, with visible wheals or blanching as indicators of correct placement. Detailed technical injection parameters from the reviewed studies are summarized in **Table 1**.

Across the reviewed studies, the most frequently reported technique involved superficial intradermal microdroplet injections of diluted BoNT-A, typically at concentrations of 20–40 U/mL, administered with a fine needle into the superficial dermis. Total dose and delivery technique varied according to the treatment area and study design.

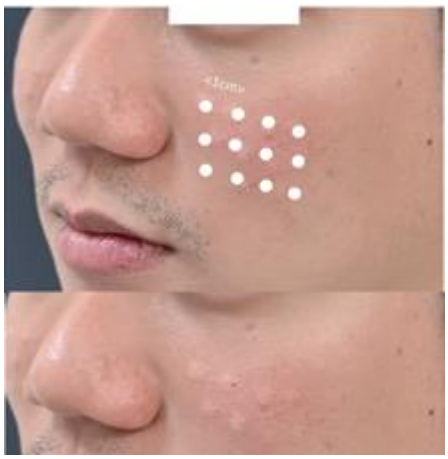


Figure 4 Representative intradermal botulinum toxin type A (BoNT-A) injection protocol for enlarged facial pores based on the reviewed studies. (A) Representative grid-based injection pattern across pore-dense cheek skin, with injection points spaced approximately 1 cm apart. (B) Clinical appearance following treatment.

Although the details of specific protocols varied across studies, the overall technical rationale was consistent: to achieve diffuse perifollicular exposure while minimizing deeper muscular diffusion. This distinction is clinically important, as excessive depth may reduce precision and increase the risk of unwanted muscle weakness, while overly concentrated or poorly distributed injections may lead to inconsistent results.

Safety outcomes were generally favorable. The most common adverse effects included transient erythema, mild burning, edema, bruising, papules, and short-lived injection-site swelling. These events were typically self-limited and resolved without treatment. More serious adverse events were rare, though one split-face trial reported transient facial palsy, suggesting the importance of superficial placement, careful dosing, and avoidance of diffusion into adjacent facial muscles. In combination therapy studies, the addition of hyaluronic acid was associated with a higher incidence of papules or persistent edema compared with BoNT-A monotherapy.

Taken together, the evidence suggests that injection technique is not merely a procedural detail, but a critical factor of both efficacy and safety. This supports the need for standardized technical parameters in future clinical trials and reporting guidelines.

In our clinical demonstration (cases 1 and 2), 20 units of onaBoNT-A were diluted to a concentration of 20 U/mL and injected intradermally into the superficial dermis using a 30G needle in a bevel-up approach at approximately 10–15° relative to the skin surface, with approximately 0.2 U administered per injection site. Injections were placed at 1-cm

intervals across pore-dense facial areas, producing visible superficial dermal wheals that confirmed correct intradermal placement **(Figure 4)**. Both the patient and the treating physician observed clear improvement in pore appearance and overall skin texture within 1 month, with no adverse events reported. Although this represents a single illustrative case, it is consistent with the dosing range, grid-based spacing, and superficial dermal injection depth summarized in **Table 1**, showing the practical feasibility of applying literature-derived intradermal injection principles in a real-world clinical practice.

Ethics approval and informed consent: The clinical demonstration cases were approved by the Institutional Review Board of Dhurakij Pundit University (DPU) (IRB No. DPUHRES2403/2568 dated 24.03.2026). Written informed consent was obtained from all patients for the use and publication of identifiable facial photographs.

Discussion

The available evidence supports the efficacy of intradermal botulinum toxin A (BoNT-A) in reducing both sebum production and pore size. Across randomized trials, prospective cohorts, and retrospective studies, most investigations have shown meaningful clinical improvements, typically accompanied by high levels of patient satisfaction.[13,20,22,23,25,31] This consistency across different populations enhances the potential role of BoNT-A as a minimally invasive treatment option for patients with oily skin and enlarged pores.

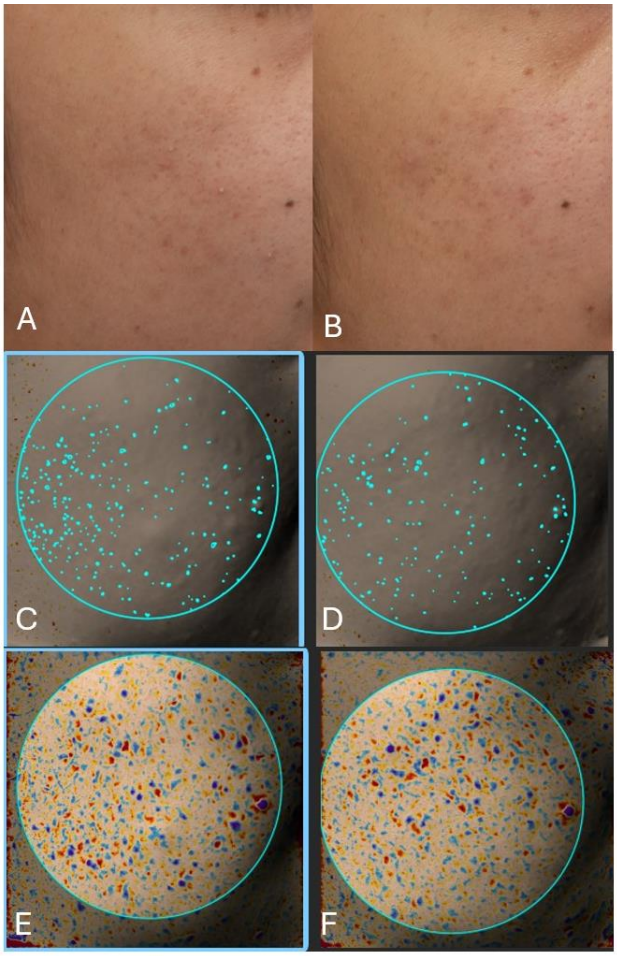


Figure 6 *Case 2* Clinical and instrument-based assessment of cheek skin following intradermal BoNT-A treatment (A) Baseline clinical photograph (B) Follow-up clinical photograph showing visible improvement in pore appearance (C–D) Antera 3D analysis illustrating reductions in pore number and volume (E–F) Topographic maps demonstrating improvement in overall skin surface texture.



Figure 5 *Case 1* Clinical demonstration of intradermal microdroplet BoNT-A injection technique and treatment response. (A–B) Baseline clinical photographs prior to intervention. (C-D) One-month follow-up showing improvement in pore appearance and enhanced skin smoothness.

In the meantime, the studies show considerable variation. Differences in formulations, dilution ratios, injection techniques, and total dosing complicate direct comparison of

outcomes.[17,19,21,22] Detailed technical parameters, including dilution (U/mL), needle gauge, spacing, and injection depth, are summarized in **Table 1**. Reported treatment protocols range from 10 units per cheek to over 50 units for full-face treatment, injected via intradermal microdroplets, mesotherapy injectors, or microneedling-assisted approaches. This variability likely contributes to differences in reported efficacy and durability, suggesting the need for standardized protocols. Nevertheless, most regimens converge on high-dilution intradermal microdroplet injections (approximately 20–40 U/mL) with 1-cm grid spacing in the superficial dermis, which may serve as a practical foundation for protocol standardization.

Duration of effect is another important factor. Most studies report improvements lasting 2–4 months, although some trials observed improvements up to 6 months.[13,20,24,25] Factors such as skin type, injection depth, dilution, and adjunctive therapies may influence treatment longevity. Patients with oily skin appear to gain the most consistent benefit,[20,24,25] while outcomes in non-oily skin are more variable.

Safety outcomes are generally reassuring, with adverse events typically mild and transient, including erythema,[25,27] edema,[24] and bruising. Nevertheless, more notable concerns include papule formation and persistent edema particularly when BoNT-A is combined with crosslinked hyaluronic acid, and one reported case of transient facial palsy associated with higher doses of incobotulinumtoxin A. These findings highlight the importance of careful patient selection, appropriate dosing, and precise injection technique. Another issue is the risk of immunogenicity with repeated treatments.[28] Though rare, neutralizing antibody formation could potentially reduce long-term efficacy. Expert consensus suggests that incobotulinumtoxin A, which lacks complexing proteins, may carry a lower risk of immunogenicity compared with other formulations, making it a reasonable choice for patients expected to undergo multiple sessions.

When compared with existing treatments, BoNT-A offers distinct advantages but also notable limitations. Topical retinoids and niacinamide[4] remain first-line for seborrhea but require strict adherence and may cause irritation. Energy-based devices, such as fractional lasers and radiofrequency,[26] can improve pores and skin texture but are costly, with downtime and risk of post-inflammatory hyperpigmentation, particularly in darker skin types. In contrast, BoNT-A is minimally invasive, well tolerated, and associated with minimal downtime. However, its temporary duration, off-label status, and procedure cost may limit accessibility, especially in resource-constrained settings. Patient acceptability is likely to be high in populations already familiar with cosmetic BoNT-A for wrinkles, but broader adoption may depend on clearer guidelines, cost-effectiveness data, and cultural perceptions of injectable.

Future research should focus on standardized dose–response studies, head-to-head comparisons with other modalities, and long-term randomized controlled trials. Multicenter studies across diverse ethnic groups are particularly important to confirm generalizability.[22,26] Evaluation of immunogenicity risk, cost-effectiveness, and patient preference[28] will be critical in determining whether BoNT-A can move from an off-label adjunct to a mainstream, evidence-based therapy for sebaceous control and pore reduction.

Taken together, intradermal BoNT-A could be a promising treatment option for patients with refractory seborrhea and enlarged pores. When appropriately applied, it has shown consistent efficacy, high patient satisfaction, and a favorable safety profile. Nevertheless, its off-label nature, heterogeneous protocols, temporary effects, and unsolved questions about immunogenicity and cost highlight the need for further well-designed studies. More rigorous trials will be essential before BoNT-A can be integrated into routine clinical practice as an evidence-based therapy for pore reduction and sebaceous control.

Conclusion

Intradermal botulinum toxin A has emerged as a promising treatment for reducing sebum production and improving the appearance of enlarged facial pores. Evidence from multiple clinical studies supports its short- to mid-term efficacy and generally favorable safety profile, particularly in patients with oily skin. Nevertheless, the current literature remains limited by small sample sizes, varied protocols, and relatively short follow-up periods.

Future studies should focus on standardizing dilution ratios and grid-based injection techniques to ensure reproducible outcomes across different clinical settings. Large, multicenter randomized controlled trials are needed to confirm efficacy across diverse populations and Fitzpatrick skin types. Furthermore, long-term safety data on repeated intradermal injections will be essential to clarify risks of adverse events, such as immunogenicity, and to provide guidance for maintenance therapy. Addressing these gaps will be critical for integrating BoNT-A into routine evidence-based practice for sebaceous control and pore reduction.

Declaration of patient consent The authors certify that they have obtained all appropriate patient consent.

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Conflict of interest There are no conflicts of interest.

Author's contribution

TS: Conceived the review, designed the literature search, conducted the literature search, screened search results, assessed the quality of included studies, extracted and interpreted the data, and prepared the figures and tables. Drafted the manuscript and revised it throughout the writing process.

AK: Contributed to interpretation of the evidence and provided expert academic advice during the development of the review. Critically reviewed the manuscript for important intellectual content.

TT: Contributed to interpretation of the evidence and provided expert clinical advice. Critically reviewed the manuscript for important intellectual content.

SL: Conceived the review, supervised the study, contributed to literature search design, interpreted the evidence, and provided overall academic guidance. Critically revised and substantially edited the manuscript for important intellectual content.

Every author has given final approval of the manuscript version to be published and agreed to be accountable for all aspects of the work.

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