Cosmetic Injection Techniques

A Text and Video Guide to Neurotoxins and Fillers

Second Edition

Theda C. Kontis
Victor G. Lacombe

Online at MedOne Videos

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Theda C. Kontis, MD, FACS
Associate Professor
The Johns Hopkins University Hospital
Board-Certified Facial Plastic Surgeon
Facial Plastic Surgicenter
Baltimore, Maryland

Victor G. Lacombe, MD
Board-Certified Facial Plastic Surgeon
Santa Rosa, California

Sarah E. Faris, MA, CMI
Assistant Professor
Virginia Commonwealth University
School of the Arts
Medical Illustrator
Richmond, Virginia

Foreword by **Jean D. Carruthers, MD, FRCSC, FRC(Ophth)**
Fellow, American Society of Ophthalmic Plastic and Reconstructive Surgery
Clinical Professor, Department of Ophthalmology
University of British Columbia
Vancouver, British Columbia, Canada

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+1 800 782 3488, customerservice@thieme.com

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Rüdigerstrasse 14, 70469 Stuttgart, Germany
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Thieme Publishers Delhi
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I dedicate this second edition to David and Alexandra, for their love and support; to Mom, my greatest fan; and to the memory of my father, my angel.

– TCK

I dedicate, with love, this second edition to my wife, Alice, and to my children, Victoria and Max: you all mean the world to me.

– VGL

We jointly dedicate this book to our patients, whose trust and feedback allow us to improve and refine our injection techniques.

– TCK and VGL

Contents

▶ *denotes a chapter with video content on MedOne*

Foreword

Dr. Theda C. Kontis and Dr. Victor G. Lacombe have now published their combined experiences in this second edition of their practical handbook, *Cosmetic Injection Techniques*. The first edition was not only a bestseller but also had such quality videos that they were the most accessed videos in all of Thieme's library. The authors have again done a superb job in making facial tissue "transparent" for everyone interested in this increasingly important subject area. New subjects covered include the injectable consultation, choosing the right filler, neurotoxin and filler treatment for the décolleté, filler to the mandibular angle and jawline, the de Maio technique for midface volumization, neurotoxins for sweaty scalps and foreheads, fillers for fine lines, and gender-specific indications/injections. With the new use of sodiumdeoxycholate there is a further section on submental fat injections.

Cosmetic surgeons have the privilege of using transcutaneous treatments to restore patients' faces to their natural best. This book with its videos is a labor of love written by highly respected authors who discuss variations in techniques from the East and the West Coasts of the United States. I recommend it to all readers who choose to review their treatment plans from start to finish and who value learning from experts who teach with passion as well as knowledge.

Jean D. Carruthers, MD, FRCSC, FRC(Ophth)
Fellow, American Society of Ophthalmic Plastic and Reconstructive Surgery
Clinical Professor, Department of Ophthalmology
University of British Columbia
Vancouver, British Columbia, Canada

Preface

I hear and I forget.
I see and I remember.
I do and I understand.
– attributed to Confucius (551–479 BCE)

We are pleased to present this revised second edition of *Cosmetic Injection Techniques: A Text and Video Guide to Neurotoxins and Fillers*. This new edition includes new fillers and new techniques as well as information on fat-dissolving injections. The accompanying videos have also been updated. Our readers found the first edition to be a handy quick-reference guide as well as a guide to new injection techniques. Patients in the office have enjoyed looking through this text so they may better understand the injections they are about to receive, and injectors have found the diagrams to be useful for patient education.

The number of non-surgical facial enhancements has continued to skyrocket since our first edition was published. As a consequence of patient demand, many physicians, nurses, and physician assistants have begun to treat such patients. This book, with its accompanying videos, is meant to be a guide and quick reference for the many professionals and paraprofessionals who have become facial injectors. It is not, however, a training manual for the naive injector. We highly discourage the novice injector from using this book as a primer on injections. In our opinion, nothing can replace training that is offered by courses and by one-on-one preceptorships.

This book is designed to augment the knowledge of a beginner injector and to train the experienced injector in how to perform "finesse" injections. The face can be shaped and minor irregularities and asymmetries improved by performing the techniques we describe. In addition, we hope to help the injector "look through" the skin to the underlying anatomy. This will help with both the targets of injection and the important structures to avoid. The authors are aware that there is more than one way to treat a given anatomic region. It was our aim, by having authors from two very different locales (the East and the West Coasts of the United States) and different practices, to describe the "best" injection technique by comparing our techniques of injection. In cases where the authors' techniques differ markedly, both techniques are presented.

The products described herein are all U.S. Food and Drug Administration (FDA)-approved fillers and neurotoxins; however, most of the techniques described are considered "off-label" uses of the products. The doses of products described serve as a general guide for injection. While the utmost care was taken to assure the accuracy of the dosages listed, we urge injectors to use their best judgment or experience in the unlikely event that a misprint suggests an inappropriate dose. The comments we make about specific products are often our opinion derived from clinical observation. Others may have different observations clinically, and we respect these variations in clinical practices and results.

We realize that this book will be utilized by injectors with differing skill levels. In an attempt to promote safety in the use of these products, we have devised a rating scale for each technique. Each injection technique is evaluated in terms of difficulty for the trainer, risks involved in performing the injection, and patient satisfaction with the results. Appendix A lists the chapters by degree of difficulty, as a cross reference for injectors who would like to safely advance to more challenging injection techniques. The rating system is summarized as follows:

Degree of difficulty for the injector:
- ● Easy
- ●● Intermediate
- ●●● Advanced
- ●●●● Expert (only expert injectors should attempt these injections)

Patient satisfaction with the procedure:
- ● Variable results, results may be subtle
- ●● Good results, patients usually pleased
- ●●● High patient satisfaction, predictable results

Risks of complications:
- ● Low
- ●● Medium
- ●●● High

The products described in this book include Botox, Dysport, Xeomin, Restylane, Restylane Lyft, Restylane Silk, Restylane Refyne, Restylane Defyne, Juvéderm Volbella, Juvéderm Vollure, Belotero, Radiesse,

Sculptra, and Bellafill. These products are the most commonly used fillers and neurotoxins at the time this manual is being written. New products are continually being developed and may be available by the time of publication. However, because we have no experience with these new products, they are necessarily not described in this second edition. Experienced injectors, however, will be able to extrapolate the techniques and dosing strategies described in this book to newer products, if they so desire.

Disclosures: Theda C. Kontis is a speaker/trainer for Allergan and for Galderma. Victor G. Lacombe is a speaker/trainer for Allergan and for Galderma and served as a principal investigator for Juvéderm Voluma.

Disclaimer: The material presented is a compilation of the clinical experiences of the authors. Off-label uses of FDA-approved products are described. A qualified health care professional should be consulted before using any therapeutic procedure discussed. Readers should verify all information and data before treating patients or employing any therapies described in this publication.

Acknowledgments

The authors believed that a simplified, well-illustrated, and thorough guide to injectables was needed in the medical literature. The editors at Thieme Publishers, in particular Timothy Hiscock, trusted our vision, and in the first edition we produced one of the best-selling books and most accessed videos in Thieme's collection. We were delighted when asked to produce this second edition.

We appreciate the editorial support and assistance from J. Owen Zurhellen and Sue Hodgson at Thieme, who kept the project moving forward. The quality of this book has much to do with the fine artwork of our medical illustrator, Sarah E. Faris, who graciously agreed to continue the work in this edition. Her attention to detail and artistic skill made this textbook one that is not only thorough but easy to read and understand.

Finally, and most importantly, we thank our patients who have agreed to have their procedures filmed so that medical professionals can learn safe and effective injection techniques.

Menu of Accompanying Videos

Video 6.1 Neurotoxin Injection for Glabellar Frown Lines
Video 6.2 Neurotoxin Injection for Glabellar Frown Lines
Video 6.3 Neurotoxin Injection for Glabellar Frown Lines
Video 6.4 Neurotoxin Injection for Glabellar Frown Lines, Forehead Wrinkles, Smile Lines, and Crow's Feet
Video 6.5 Neurotoxin Injection for Glabellar Frown Lines, Forehead Wrinkles, and Lower Eyelid Roll
Video 6.6 Neurotoxin Injection for Glabellar Frown Lines and Forehead Wrinkles
Video 6.7 Neurotoxin Injection for Glabellar Frown Lines and Dimpled Chin
Video 6.8 Neurotoxin Injection for Glabellar Frown Lines
Video 6.9 Neurotoxin Injection for Glabellar Frown Lines
Video 6.10 Neurotoxin Injection for Glabellar Frown Lines

Video 7.1 Neurotoxin Injection for Forehead Wrinkles
Video 7.2 Neurotoxin Injection for Forehead Wrinkles
Video 7.3 Neurotoxin Injection for Forehead Wrinkles
Video 7.4 Neurotoxin Injection for Forehead Wrinkles
Video 7.5 Neurotoxin Injection for Glabellar Frown Lines, Forehead Wrinkles, Smile Lines, and Crow's Feet
Video 7.6 Neurotoxin Injection for Glabellar Frown Lines and Forehead Wrinkles
Video 7.7 Neurotoxin Injection for Glabellar Frown Lines, Forehead Wrinkles, and Lower Eyelid Roll
Video 7.8 Neurotoxin Injection for Forehead Wrinkles
Video 7.9 Neurotoxin Injection for Forehead Wrinkles

Video 8.1 Neurotoxin Injection for Glabellar Frown Lines, Forehead Wrinkles, Smile Lines, and Crow's Feet
Video 8.2 Neurotoxin Injection for Lower Eyelid Roll
Video 8.3 Neurotoxin Injection for Smile Lines and Crow's Feet
Video 8.4 Neurotoxin Injection for Smile Lines and Crow's Feet
Video 8.5 Neurotoxin Injection for Smile Lines and Crow's Feet

Video 9.1 Neurotoxin Injection for Lateral Brow Lift

Video 10.1 Neurotoxin Injection for Chemical Brow Lift
Video 10.2 Neurotoxin Injection for Chemical Brow Lift

Video 11.1 Neurotoxin Injection for Glabellar Frown Lines, Forehead Wrinkles, and Lower Eyelid Roll

Video 12.1 Neurotoxin Injection for Bunny Lines

Video 13.1 Neurotoxin Injection for Nasal Tip Lift

Video 15.1 Neurotoxin Injection for Elevating the Oral Commissures

Video 16.1 Neurotoxin Injection for Lip Lift

Video 17.1 Neurotoxin Injection for Smoker's Lines

Video 18.1 Neurotoxin Injection for Gummy Smile

Video 19.1 Neurotoxin Injection for Dimpled Chin
Video 19.2 Neurotoxin Injection for Glabellar Frown Lines and Dimpled Chin
Video 19.3 Neurotoxin Injection for Elevating the Oral Commissures and for Dimpled Chin
Video 19.4 Neurotoxin Injection for Elevating the Oral Commissures and for Dimpled Chin
Video 19.5 Neurotoxin Injection for Dimpled Chin

Video 20.1 Neurotoxin Injection for Platysmal Banding

Video 21.1 Neurotoxin Injection for Necklace Lines

Video 22.1 Neurotoxin Injection for the Décolleté

Video 23.1 Neurotoxin Injection for Nefertiti Neck Lift

Video 24.1 Neurotoxin Injection for Masseter Hypertrophy
Video 24.2 Neurotoxin Injection for Masseter Hypertrophy

Video 28.1 Neurotoxin Injection for Profusely Sweating Underarms

Video 35.1 Dental Block 1
Video 35.2 Dental Block 2

Video 38.1 Filler Injection for Nasolabial Folds and Elevating the Oral Commissures
Video 38.2 Filler Injection for Nasolabial Folds, Marionette Lines, and Elevating the Oral Commissures
Video 38.3 Filler Injection for Nasolabial Folds, Marionette Lines, and Elevating the Oral Commissures
Video 38.4 Filler Injection for Nasolabial Folds, Marionette Lines, Elevating the Oral Commissures, and Jawline Rejuvenation
Video 38.5 Filler Injection for Nasolabial Folds, Marionette Lines, and Jawline Rejuvenation
Video 38.6 Filler Injection for Nasolabial Folds, Marionette Lines, Elevating the Oral Commissures, and Mental Crease
Video 38.7 Filler Injection for Nasolabial Folds, Elevating the Oral Commissures, Tear Trough Deformity, and Sunken Cheeks
Video 38.8 Filler Injection for Nasolabial Folds, Marionette Lines, and Jawline Rejuvenation
Video 38.9 Filler Injection for Nasolabial Folds, Elevating the Oral Commissures, Mental Crease, and Jawline Rejuvenation
Video 38.10 Filler Injection for Nasolabial Folds

Video 40.1 Fillers for Fine Lines and Skin Boosters
Video 40.2 Fillers for Fine Lines and Skin Boosters

Video 41.1 Filler Injection for Marionette Lines
Video 41.2 Filler Injection for Marionette Lines, Lip Augmentation, and Elevating the Oral Commissures
Video 41.3 Filler Injections for Nasolabial Folds, Marionette Lines, and Jawline Rejuvenation
Video 41.4 Filler Injections for Nasolabial Folds, Marionette Lines, and Jawline Rejuvenation
Video 41.5 Filler Injections for Nasolabial Folds, Marionette Lines, Elevating the Oral Commissures, and Mental Crease
Video 41.6 Filler Injections for Nasolabial Folds, Marionette Lines, Elevating the Oral Commissures, and Jawline Rejuvenation

Video 42.1 Filler Injection for Lip Augmentation
Video 42.2 Filler Injection for Marionette Lines, Lip Augmentation, and Elevating the Oral Commissures
Video 42.3 Filler Injection for Lip Augmentation, Elevating the Oral Commissures, and for Vertical Lip Lines
Video 42.4 Filler Injection for Lip Augmentation

Video 43.1 Filler Injection for Nasolabial Folds, Marionette Lines, Elevating the Oral Commissures, and Mental Crease
Video 43.2 Filler Injection for Lip Augmentation and for Elevating the Oral Commissures
Video 43.3 Filler Injection for Nasolabial Folds, Elevating the Oral Commissures, Tear Trough Deformity, and Sunken Cheeks
Video 43.4 Filler Injection for Nasiolabial Folds, Marionette Lines, Elevating the Oral Commissures, and Jawline Rejuvenation
Video 43.5 Filler Injection for Marionette Lines, Lip Augmentation, and Elevating the Oral Commissures
Video 43.6 Filler Injection for Lip Augmentation, Elevating the Oral Commissures, and for Vertical Lip Lines
Video 43.7 Filler Injection for Elevating the Oral Commissures
Video 43.8 Filler Injection for Elevating the Oral Commissures
Video 43.9 Filler Injection for Elevating the Oral Commissures
Video 43.10 Filler Injection for Elevating the Oral Commissures

Video 44.1 Filler Injection for Lip Augmentation, Elevating the Oral Commissures, and for Vertical Lip Lines
Video 44.2 Filler Injection for Vertical Lip Lines
Video 44.3 Filler Injection for Vertical Lip Lines

Video 45.1 Filler Injection for Glabellar Frown Lines

Video 47.1 Filler Injection for Tear Trough Deformity and Cheekbone Augmentation
Video 47.2 Filler Injection for Tear Trough Deformity and Medial Midface Hollowing

Video 49.1 Filler Injection for Lateral Brow Lift
Video 49.2 Filler Injection for Lateral Brow Lift
Video 49.3 Filler Injection for Lateral Brow Lift

Video 50.1 Filler Injection for Sunken Temples

Video 51.1 Filler Injection for Non-Surgical Rhinoplasty

Video 52.1 Filler Injection for Nasal Valve Stenting

Video 53.1 Filler Injection for Medial Midface Hollowing

Video 54.1 Filler Injection for Cheekbone Augmentation
Video 54.2 Filler Injection for Cheekbone Augmentation

Video 55.1 Filler Injection for Nasolabial Folds, Elevating the Oral Commissures, Tear Trough Deformity, and Sunken Cheeks

Video 56.1 Filler Injection for Cheek Lift: The de Maio Technique

Video 58.1 Filler Injection for the Mental Crease

Video 58.2 Filler Injection for Nasolabial Folds, Marionette Lines, Elevating the Oral Commissures, and Mental Crease

Video 59.1 Filler Injection for Jawline Rejuvenation
Video 59.2 Filler Injection for Nasolabial Folds, Marionette Lines, and Jawline Rejuvenation
Video 59.3 Filler Injection for Nasolabial Folds, Marionette Lines, and Jawline Rejuvenation
Video 59.4 Filler Injection for Jawline Rejuvenation

Video 61.1 Filler Injection for Earlobe Rejuvenation

Video 63.1 Filler Injection for Aging Hands
Video 63.2 Filler Injection for Aging Hands

Video 64.1 Filler Injection with Poly-L-Lactic Acid for Facial Volumizing (Sculptra)
Video 64.2 Filler Injection with Poly-L-Lactic Acid for Facial Volumizing (Sculptra)

Video 69.1 Injection Technique for Submental Fat Reduction

Section I

Introduction to Injectables

I

1
The Consultation

Initial Evaluation

A combination of factors can lead a patient to visit a provider for injectable treatment or evaluation. Often it is a result of the patient looking or feeling tired, or being told that they give that impression to others. Sometimes it is the drive for youthful appearance or for simply a different look (whether that is fewer wrinkles, fuller lips, or higher cheek bones). The motivation for change may be preparation for an event that is fast approaching, like a wedding or reunion, or a longer-term goal, such as maintaining a competitive edge in the job market. All of these factors must be determined in the first discussions prior to developing the plan. The time frame for treatment and recovery, longevity of results, and patient expectations must be part of the planning.

Anatomic Considerations

The injector must have a thorough and comprehensive understanding of facial bone structure, muscle location and function, skin structure and thicknesses, as well as the location of nerve and vascular supplies to the face and neck. Greater familiarity will lead to increased comfort, sophistication, and talent with both diagnosing and treating the changes seen in facial aging. Most aging changes are a result of facial fat loss and redistribution away from key areas of the face, which leads to sagging, undesirable folds, and skeletonization. Loss of fat in the forehead and temples leads to dropping brows and hollowing of the temples. Loss of fat on the cheeks and around the eyes causes dark circles under the eyes and drooping of the malar skin, creating deeper nasolabial folds as well as hollowing, melolabial folding, and jowling. Buccal fat loss contributes to a gaunt look in the lower cheek and can create the effect of a "pouch" lateral to the mouth (which is really just a prominent modiolus due to hollowing anteriorly and posteriorly). Intrinsic changes of the skin due to solar exposure and collagen and elastin loss can accentuate these changes. Recognizing, understanding, and explaining to patients the global effects of these anatomic changes will greatly facilitate the consultation.

Consultation Techniques

A mirror placed on a desk in front of the patient (or a hand-held mirror) is used so that the patient's facial features can be analyzed, both at rest and in animation. It is important to ask patients about what bothers them the most when they look into the mirror. Sometimes the practitioner's trained eye targets an area that turns out not to bother the patient at all. Patients are happiest when we listen to and address *their* concerns first. After we discuss how we can (or cannot) improve

what bothers them, then we can help them develop a plan for total facial rejuvenation, if they so desire.

Pointing out facial asymmetries or irregularities should be done as part of the pre-injection teaching. Patients may not see their asymmetries pre-injection but will note them post-injection. Photographic documentation is essential to document the pre-injection appearance. Three-dimensional photography is another helpful tool that can be used as an objective means to demonstrate areas of concavity and asymmetry as well as skin changes.

Once the need for treatment is established, a summary of the tools available, including neurotoxins for relaxing, fillers for volume restoration, skin boosting, and line filling, is in order. Patients may have heard of the different brand names but are often ignorant of where they go, how they work, and how long the results will last. One should develop clear, concise talking points on the products used, which include safety and recovery profiles. Next, the injector should recommend the quantity of product necessary for a complete correction and a conservative estimate as to when that would need to be re-treated. This should also be provided in written estimate form to avoid any later confusion. An example would be 50 units of Botox to treat the glabella, forehead, and crow's feet, and six syringes of hyaluronic acid (HA) filler to treat under eyes, upper cheek bones, melolabial folds, lip lines, and jawline. The patient should understand that the injections can be done either all at once or in stages, as the patient's budget allows. This would complete the consultation and leave the patient well educated and not feeling like they were pressured.

Some patients will want to be injected at their initial consultation, and others will just want to develop a plan by gaining information and having their questions answered. The initial consultation can be overwhelming for a patient new to injectables. It is important to proceed slowly at first. If a patient is not a candidate for neurotoxins or fillers, be honest about it.

Precautions

The injector must listen to patients and take cues from their body language about how comfortable they are with the concept of injectables and how willing they are to proceed. Some patients are very timid and self-conscious about discussing aesthetic issues. In those cases, it is best not to overwhelm them with too many things that they did not initially seek advice about lest they be scared away. Other patients may be open to a clinician's advice as to what is available and will want to learn all that is possible. Listen carefully to patients and address their primary aesthetic concerns first.

Body dysmorphic disorder (BDD) is a syndrome that all injectors should understand. Know that BDD patients often desire our expertise: these patients have abnormal body perceptions, and small abnormalities are magnified in their mind. It is difficult, if not impossible, to please such patients, so proceed with caution. In practice, it is more likely to regret injecting someone than to regret *not* injecting them!

Additional Reading

[1] Coleman SR, Grover R. The anatomy of the aging face: volume loss and changes in 3-dimensional topography. Aesthet Surg J. 2006; 26 1S:S4–S9

[2] Crerand CE, Menard W, Phillips KA. Surgical and minimally invasive cosmetic procedures among persons with body dysmorphic disorder. Ann Plast Surg. 2010; 65(1):11–16

[3] Matarasso A, Nikfarjam J, Abramowitz L. Incorporating Minimally Invasive Procedures into an Aesthetic Surgery Practice. Clin Plast Surg. 2016; 43(3):449–457

2
The Physicians Aesthetic Coalition for Injectable Safety

The increased popularity of injectable procedures has been accompanied by an unfortunate increase in the performance of these procedures by unqualified personnel. It is the authors' concern that the use of this book by untrained individuals could produce disastrous results. The Physicians Aesthetic Coalition (PAC) was created to provide information on qualified injectors, on materials approved by the U.S. Food and Drug Administration (FDA), and on injectable training that can be obtained by qualified professionals. We direct patients and injectors to http://www.physiciansaestheticcoalition.org for appropriate information about the safe use of injectable materials.

The PAC is represented by over 5,000 board-certified members of the American Society for Aesthetic Plastic Surgery (ASAPS), the American Society for Dermatologic Surgery (ASDS), the American Academy of Facial Plastic and Reconstructive Surgery (AAFPRS), and the American Society of Ophthalmic Plastic and Reconstructive Surgery (ASOPRS). We encourage professionals to utilize the PAC website for up-to-date information about injectables and injectable safety, laws, and ethical guidelines pertaining to the purchase of injectables, research and statistics, and courses available for training in the use of injectables.

Section II

Introduction to Neurotoxins

II

3
Neurotoxins Overview

Action

Peripheral neuromuscular blocking agents.

Mechanism of Action

Botulinum toxins irreversibly bind to the presynaptic terminal of the neuromuscular junction and prevent release of acetylcholine, thereby preventing muscle contraction.

Botulinum Toxin A (BoNTA) Formulations

Botox: OnabotulinumtoxinA (BoNTA-ONA)

- 100 BU (Botox units) per vial (also contains 0.5 mg human serum albumin, 0.9 mg sodium chloride)
- Vacuum dried
- Store in freezer until reconstituted; refrigerate after reconstitution

Dysport: AbobotulinumtoxinA (BoNTA-ABO)

- 300 DU (Dysport units) per vial (also contains 0.125 mg human serum albumin, 2.5 mg lactose)
- Lyophylized
- Store in freezer until reconstituted; refrigerate after reconstitution

Xeomin: IncobotulinumtoxinA (BoNTA-INC)

- 100 XU (Xeomin units) per vial (also contains 1.0 mg human albumin, 4.7 mg sucrose)
- Lyophylized
- Store at room temperature; refrigerate after reconstitution

Neuronox

- Approved in 2004 by the South Korean Ministry of Food and Drug Safety (MFDS), manufactured by Medy-Tox Inc. (Seoul, Korea)
- Not U.S. FDA-approved in the United States
- 50, 100, and 200 U vials available (100 U contains 0.5 mg human serum albumin and 0.9 mg sodium chloride)
- Lyophilized
- Conversion ratio appears to be 1:1 with Botox
- Store in freezer until reconstituted; refrigerate after reconstitution

PurTox

- Pending FDA approval
- Similar to Xeomin without complexing proteins

Table 3.1 Comparison of Botulinum Toxin A Formulations.

Product	Year of FDA Approval	Generic Name I	Composition	Manufacturer	Similar Product Trade Names	Dosing Ratio Compared with Botox
Botox	2002	OnabotulinumtoxinA	900 kD	Allergan Inc., Irvine, CA	Botox cosmetic, Vistabel, Vistabex	NA
Dysport	2009	AbobotulinumtoxinA	500–900 kD	Medicis Aesthetics Inc., Scottsdale, AZ	Reloxin, Azzalure	2.5–3:1
Xeomin	2011	IncobotulinumtoxinA	150 kD No complexing proteins	Merz Aesthetics Inc., Franksville, WI	Xeomeen, Bocouture	1–1.5:1
Neuronox	N/A	N/A	940 kD	Medy-Tox Inc., Seoul, Korea	Meditoxin, Cunox, Siax, and Botulift	1:1
PurTox	Pending	N/A	150 kD No complexing proteins	Mentor Corp., Santa Barbara, CA		1–1.5:1
CBTXA	N/A	N/A	900 kD	Lanzhou Biologics, Lanzhou, China	Prosigne, Lantox	?

Abbreviations: kD, kilodalton; N/A, not applicable.

CBTXA

- Not FDA-approved in the United States
- The only botulinum toxin A registered with the Chinese government
- Lyophilized
- Contains 5 mg bovine serum albumin, 25 mg dextran, 25 mg sucrose per 100 units
- Conversion ratio to Botox unknown
- Store in freezer, refrigerate after reconstituted

Botulinum Toxin B (BoNTB) Formulation

Myobloc: BoNTB (rimabotulinumtoxinB)

- Solstice Neurosciences Inc., Malvern, PA
- Trade names: MyoBloc, NeuroBloc
- Minimal use cosmetically due to painful injection and limited duration
- FDA-approved only for cervical dystonia in adult

Additional Reading

[1] Flynn TC. Advances in the use of botulinum neurotoxins in facial esthetics. J Cosmet Dermatol. 2012; 11(1):42–50
[2] Nettar K, Maas C. Neuromodulators: available agents, physiology, and anatomy. Facial Plast Surg. 2011; 27 (6):517–522
[3] Moers-Carpi M, Dirschka T, Feller-Heppt G, et al. A randomised, double-blind comparison of 20 units of onabotulinumtoxinA with 30 units of incobotulinumtoxinA for glabellar lines. J Cosmet Laser Ther. 2012; 14(6):296–303
[4] Walker TJ, Dayan SH. Comparison and overview of currently available neurotoxins. J Clin Aesthet Dermatol. 2014; 7 (2):31–39

4
Neurotoxin Preparation

Package inserts for the neurotransmitters state that they should be reconstituted with nonpreserved saline (0.9% sodium chloride). However, clinical practice has determined that using preserved saline (containing benzyl alcohol) results in much less patient discomfort.

Botox, Botox Cosmetic—100 BU (Botox units) may be reconstituted with

- 1 mL preserved saline, which produces a solution of 10 BU per 0.1 mL
- 2 mL preserved saline, which produces a solution of 5 BU per 0.1 mL
- 2.5 mL preserved saline, which produces a solution of 4 BU per 0.1 mL
- 4 mL preserved saline, which produces a solution of 2.5 BU per 0.1 mL

Xeomin—100 XU (Xeomin units) may be reconstituted and used similarly to Botox, above.

Dysport—300 DU (Dysport units) may be reconstituted with

- 2.5 mL preserved saline, which produces a solution of 12 DU per 0.1 mL
- 1.5 mL preserved saline, which produces a solution of 20 DU per 0.1 mL
- 1.0 mL preserved saline, which produces a solution of 30 DU per 0.1 mL

General conversion ratios

- 1 BU = 1.0 to 1.5 XU
- 1 BU = 2.5 to 3.0 DU

Additional Reading

[1] Bass Kaplan J. The dilution confusion: easy dosing for botulinum toxins. Plast Surg Nurs. 2016; 36(1):24–27

[2] Moers-Carpi M, Tan K, Fulford-Smith A. A multicentre, randomized, double-blind study to evaluate the efficacy of OnabotulinumtoxinA (20 units) in the treatment of glabellar lines when compared to IncobotulinumtoxinA (30 units). European Masters in Aesthetic and Anti-aging Medicine, September 30–October 1, 2011, Paris

5
Instrumentation for Neurotoxin Injections

After reconstitution, botulinum toxin A (BoNTA) can be injected using a 1-mL syringe with a 30-gauge needle. Product can be withdrawn from the vial with a 20-gauge needle, and a 30-gauge or smaller needle can then be used for injection. A “No Waste” syringe with or without a Luer lock (Acuderm Inc., Fort Lauderdale, Florida, or Exelint International, Los Angeles, California) is also available that pushes the last drop of product through the needle hub. Alternatively, non-drip insulin syringes (BD Ultra-Fine Needle, Becton Dickinson, Franklin Lakes, New Jersey) may be used. These syringes are available in 0.3 and 0.5 mL and have an attached 31-gauge, 8-mm needle.

When using these non-drip insulin syringes, the needle is pre-attached. The BoNTA must be reconstituted and the vial stopper removed. Neurotoxin is drawn up into each syringe and the syringes labeled with the product name, lot number, and expiration date. The syringes are stored in the refrigerator. Because the needles are so fine and fragile, care must be taken not to hit the vial with the needle tip while aspirating the product. In addition, the utmost care is required during re-capping of the needle (prior to patient use) to prevent damage or blunting of the fine needle tip.

Fig. 5.1 Dripless 0.5 mL (left) and 0.3 mL (right) BD insulin syringes may be used for BoNTA injections. These syringes have a pre-attached 31-gauge needle.

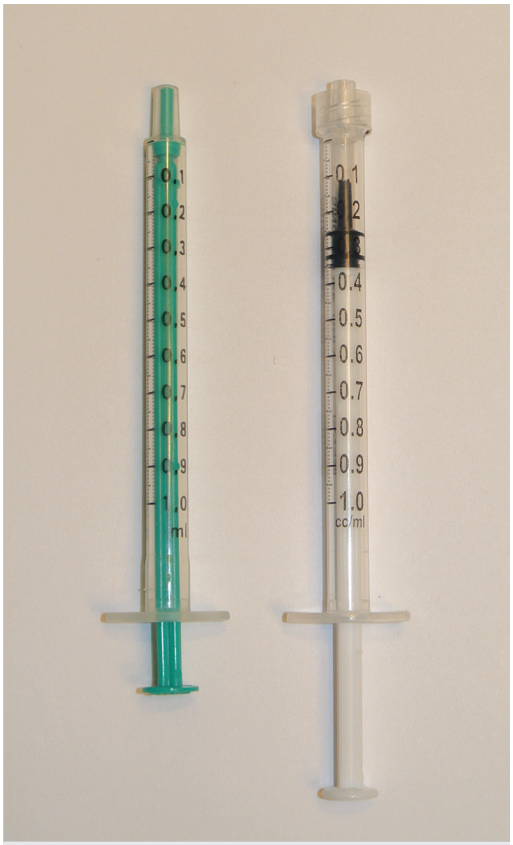


Fig. 5.2 "No Waste" syringe pushes plunger into needle hub: (left) Acuderm; (right) Exelint.

Section III

Neurotoxin Injection Techniques

III

6
Neurotoxin Injection for Glabellar Frown Lines

Difficulty: ●
Patient Satisfaction: ●●●
Risk: ●●

Indications

Neurotoxins are commonly used to treat the vertical lines between the brows. This is the only area currently FDA-approved for all BoNTA neurotoxins (Botox, Dysport, Xeomin).

Anatomic Considerations

The vertical lines of the glabella are produced by contraction of the paired corrugator supercilii muscles, and the horizontal lines are caused by contraction of the centrally located procerus muscle. The corrugators originate on the supraorbital ridge of the frontal bone and insert on the skin above the middle third of the eyebrow. The procerus muscle originates on the nasal bone and inserts onto the skin of the glabella or mid-forehead.

Although this anatomy seems straightforward, there are subtle anatomic variations that can be visualized during facial animation. We have noted two distinct patterns of corrugator positioning: either straight along the brow, or more vertically oriented in a **V**-shape. For this reason, the injector should not rely on only one technique in this area. The injector should "look through" the skin to imagine the location of the muscles and their contribution to the wrinkles produced during movement.

Injection Technique

Topical anesthesia may be used; however, this injection usually can be tolerated without anesthesia. Prior to injecting the patient, have the patient frown the brow. Attempt to look through the skin to determine the size, strength, and location of the procerus and corrugator muscles. Because the corrugator muscles insert laterally into the skin, the injector can visualize the dimpling of the skin to determine the lateral extent of the muscles.

Usual doses in this region are 20 to 30 BU (Botox units) or 50 to 80 DU (Dysport units), but injector experience with these treatments has shown that some patients can do well with as little as 10 units, and others (often men) may need substantially more.

Injections must be placed 1 cm above the superior orbital rim to reduce the risk of upper eyelid ptosis. Injections are placed in the muscle belly. Try not to

"bump" the periosteum, as this occasionally can be associated with post-injection headache.

Precautions

Injection in this area can result in an upper lid ptosis, which can be seen up to 2 weeks after injection and may last 2 to 4 weeks post-injection.

Post-Injection Instructions

There are no clinical data to suggest that giving patients post-treatment instructions decreases ptosis or improves results. However, some physicians ask their patients not to bend over, push on the injection sites, or lie down for 4 hours. They also recommend the patient not exercise that day and not actively move the injected muscles for 90 minutes.

Alternate Post-Injection Instructions

No exercise immediately after injection, as this may accentuate bruising.

Risks

Diffusion of product into the eyelid may affect the levator palpebrae superioris muscle and result in a transient ptosis.

Pearls of Injection

- Ask the patient to frown as you assess the size and shape of the muscle. ailor the treatment to the anatomy. It is important to extend the injections far enough laterally to treat the entire extent of the corrugator muscles.
- Filler injections may be necessary for deep rhytids in this region.
- Consistent retreatment of the glabella may result in the patient "unlearning" to move the brow, and thus not only improve the rhytids but also extend the time required between injections.
- Placing the thumb along the orbital rim during injection may reduce the likelihood of diffusion toward the levator palpebrae superioris muscle.

Fig. 6.1 Clinical photographs of the differing anatomy of corrugator muscles. (**a**) More horizontal muscles. (**b**) More vertical **V**-like muscles. The injector should learn to "look through" the skin to determine the anatomy.

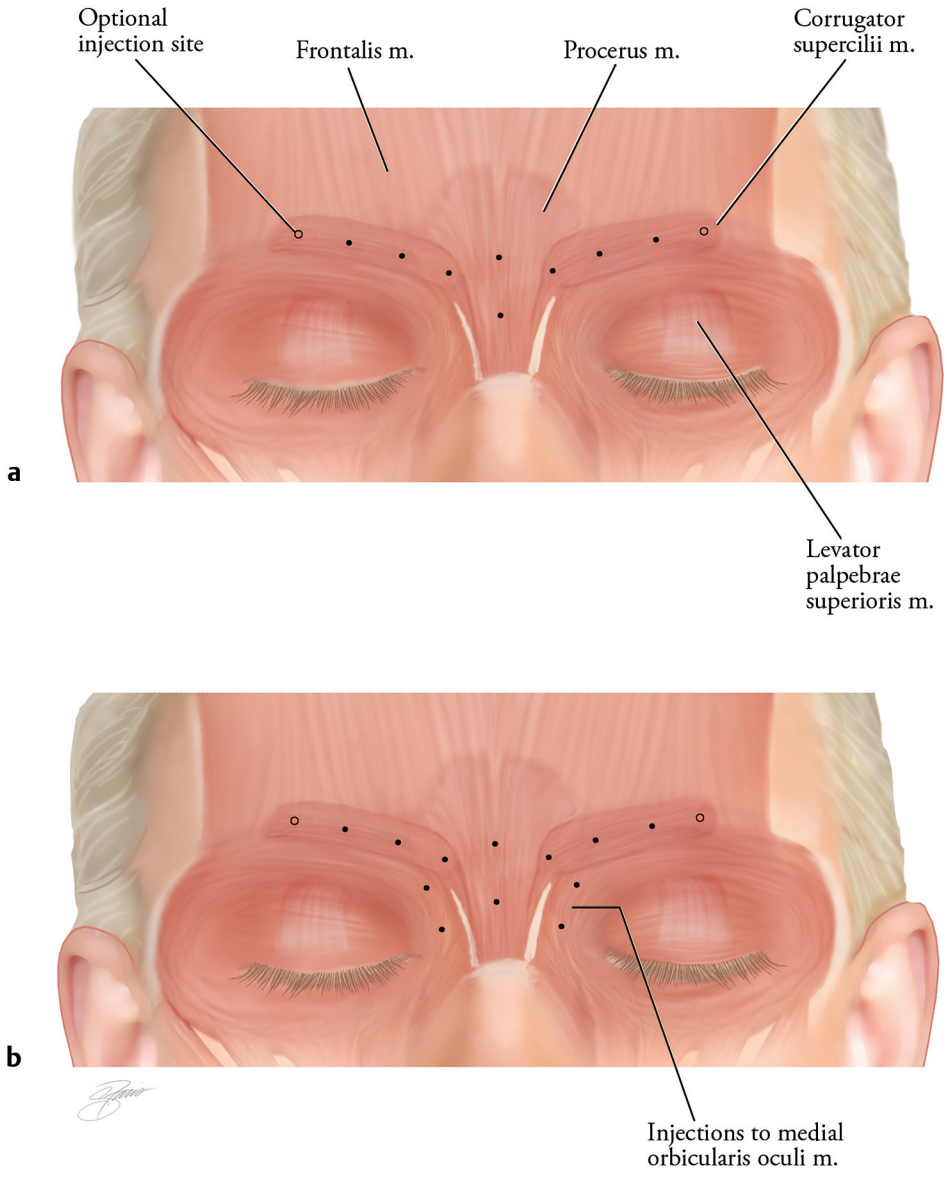


Fig. 6.2 (**a,b**) Suggested patterns of injection for more horizontal corrugator supercilii muscles. Depending on the length of the muscle, the injections may need to be placed farther out laterally. (*Open circles* denote optional injection sites.)

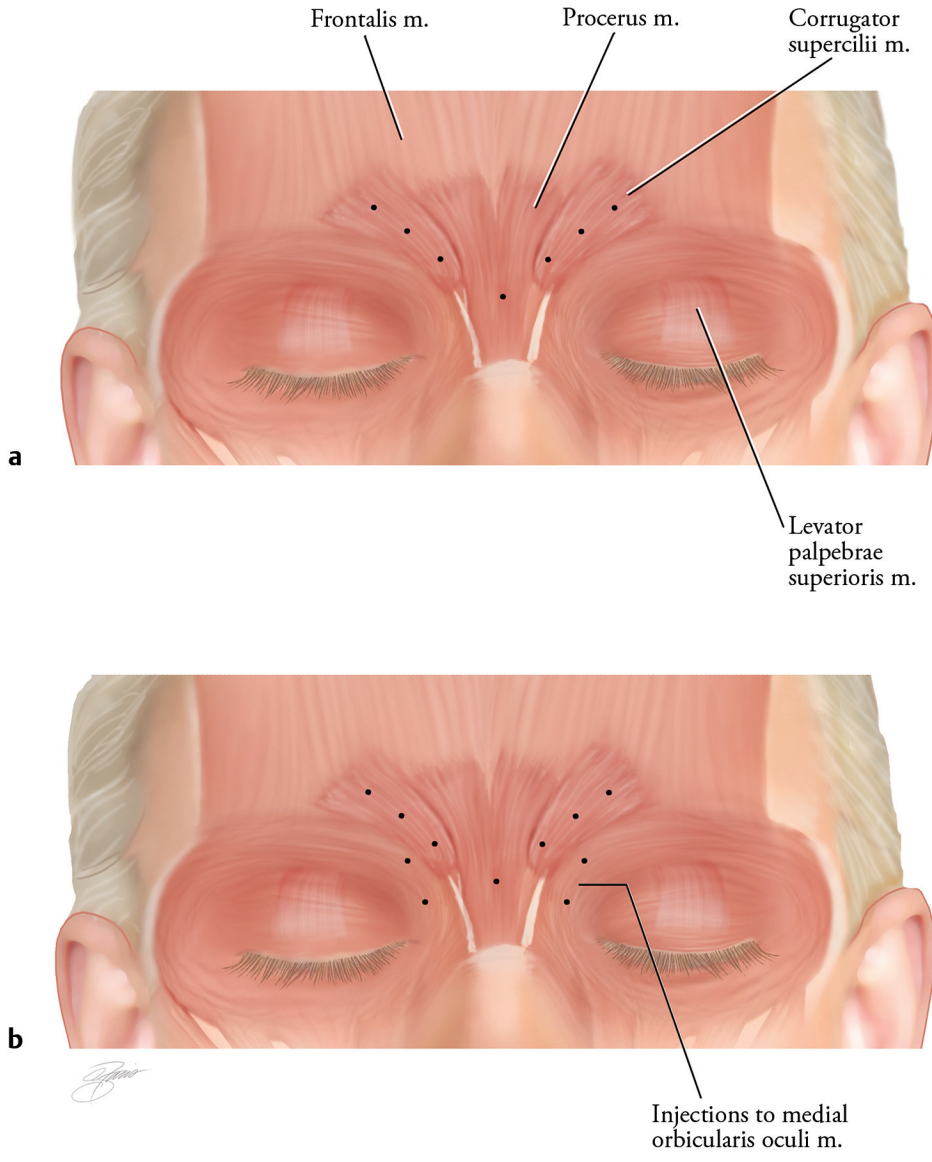


Fig. 6.3 (**a**,**b**) Suggested patterns of injection for the **V**-like corrugator supercilii muscles.

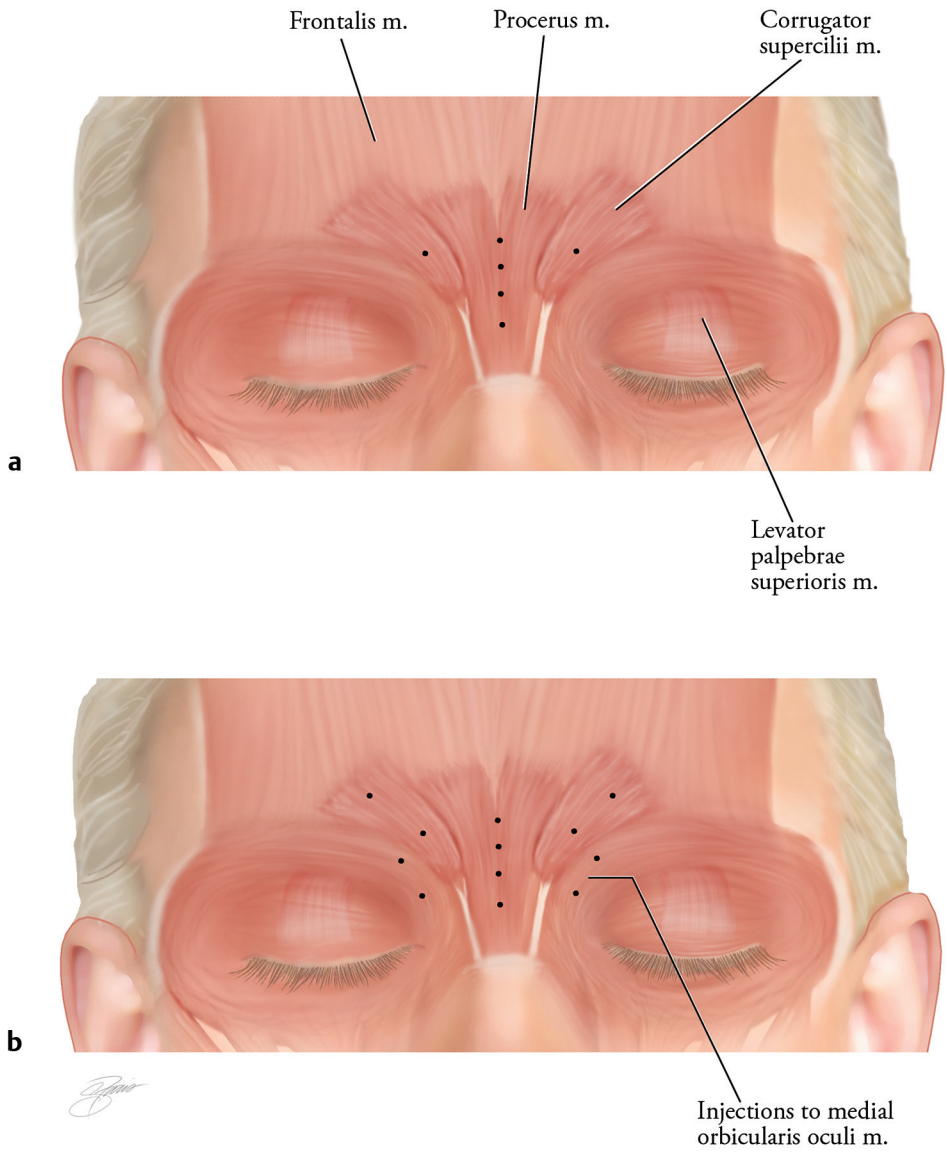


Fig. 6.4 (**a,b**) Suggested injection sites for predominantly horizontal glabellar rhytids with more contribution from the procerus muscle and less contribution from the corrugator supercilii muscles.

Additional Reading

[1] Bassichis BA, Thomas JR. The use of Botox to treat glabellar rhytids. Facial Plast Surg Clin North Am. 2003; 11(4):453–456

[2] Carruthers J, Fagien S, Matarasso SL, Botox Consensus Group. Consensus recommendations on the use of botulinum toxin type A in facial aesthetics. Plast Reconstr Surg. 2004; 114(6) Suppl:1S–22S

[3] Monheit G. Neurotoxins: current concepts in cosmetic use on the face and neck-upper face (glabella, forehead, and crow's feet). Plast Reconstr Surg. 2015; 136(5) Suppl:72S–75S

[4] Moy R, Maas C, Monheit G, Huber MB, Reloxin Investigational Group. Long-term safety and efficacy of a new botulinum toxin type A in treating glabellar lines. Arch Facial Plast Surg. 2009; 11(2):77–83

7
Neurotoxin Injection for Forehead Wrinkles

Difficulty: ●●
Patient Satisfaction: ●●●
Risk: ●●

Indications

Transverse wrinkles of the forehead.

Anatomic Considerations

Contraction of the paired frontalis muscles raises the eyebrows and upper eyelid skin, which produces transverse creases in the forehead. These muscles originate on the galea aponeurotica of the cranium and insert into the skin of the eyebrows. The frontalis muscles are often described as paired muscles that do not meet centrally. Clinically, however, the central position of the forehead is not devoid of wrinkles. Therefore, treatment of the forehead should include injections in the central aspect of the forehead.

The upper face must be assessed both in animation and at rest prior to injection. In women, the brow should lie at or just above the superior orbital rim. In men, it should lie at the bony rim.

Injection Technique

Have the patient raise and lower the brow and assess the extent of muscle movement. The frontalis muscles are located superficially, so the injections should be placed in the superficial subcutaneous tissue. Treat the entire forehead from medial to lateral. As with all BoNTA injections, male patients may require a higher dose. The typical dose ranges from 10 to 20 BU or 30 to 60 DU.

Precautions

The forehead is often described as the most difficult area to inject well. Although treatment of the forehead seems intuitively simple, common errors include overtreatment or poor injection planning. The most important rule of injection is to assess the position of the brows at rest, prior to injection of neurotoxin. Two important conditions of this region must be predetermined: the presence of brow ptosis, and increased resting tone of the muscles, which can mask brow ptosis.

In some patients, horizontal forehead creases are the result of compensation for brow ptosis. These patients often request neurotoxins to improve their deep forehead rhytids. It is important to remember that the frontalis muscles are the only muscles that elevate the brows. If the brow is ptotic, then do not inject the frontalis muscles, as this will worsen the brow ptosis. If injection must be performed on a patient with brow ptosis, plan the injections high in the forehead

so that the patient retains some brow elevation movement, or consider undertreating this entire area.

In addition, the frontalis muscles can sometimes show a resting tonic contraction that must be relaxed to determine the resting position of the brow. This may even require the injector to "smooth out" the forehead manually to encourage relaxation of the muscles. Having these patients close their eyes can help relax the frontalis muscles. Once the frontalis muscles are at rest, assess the brow position to determine if the frontalis contraction was masking brow ptosis.

Poor technique in this area can produce an odd-shaped brow. Do not limit the injections to the central brow. Do not assume that the injections cannot extend laterally. If only the center of the brow is treated, the brow will drop medially and elevate laterally, which produces an odd-appearing slanted look, sometimes referred to as the "Mr. Spock," or "Mephisto (devilish) sign." A lateral browlift can be obtained by using this technique, but proceed with caution in this area to avoid an overly slanted medial brow.

Post-Injection Instructions

Instruct the patient not to exercise immediately after treatment. Bruising may decrease the effect of the BoNTA by preventing diffusion to the neuromuscular junction.

Risks

Ptosis of the upper eyelid and unmasking brow ptosis are the major risks of this procedure. Minor risks include inappropriate injection planning, which may result in unnatural-appearing brows or persistent rhytids.

Pearls of Injection

- More than with any other area, it is imperative to observe the patient contracting and relaxing the frontalis muscles while the injector plans the injection sites.
- If the rhytids extend up to the hairline, then ensure the injections extend to this area, or it will result in a smooth forehead with a ridge of wrinkles superiorly.
- Also be sure to assess the lateral brows: occasionally these rhytids are undertreated, and deep crescent-shaped creases will be seen just above the lateral brow.
- In patients who have a preexisting unilateral myogenic upper lid ptosis, a compensatory unilateral forehead resting contraction may be seen. If so, injection of the forehead may actually worsen the ptosis. Assess these areas carefully prior to injecting the patient.
- One dose of BoNTA (20–25 BU or 50–70 DU) can occasionally be used to treat both the glabella and the forehead in selected patients.

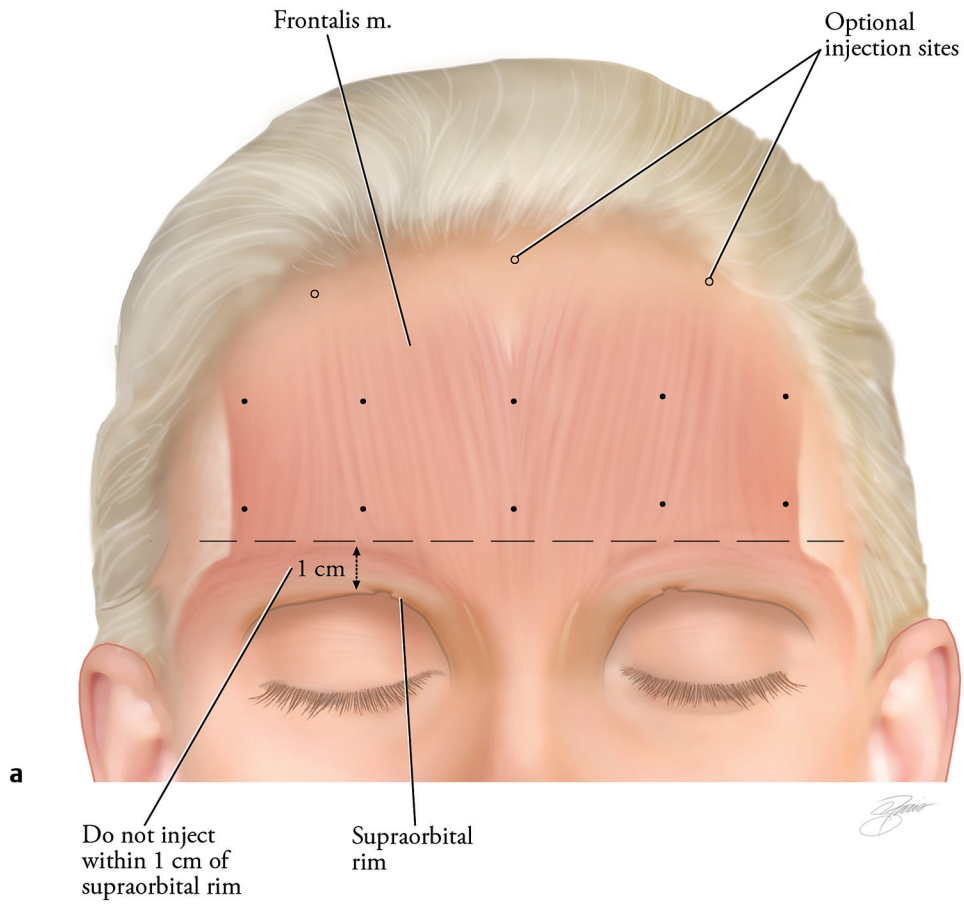


Fig. 7.1 (**a,b**) Frontalis muscle injection sites may extend up to the hairline in some individuals. Maintain a distance of 1 cm or more above the superior orbital rim. Alternate injection patterns are shown. Tailor the injection pattern to the shape and action of the muscle.

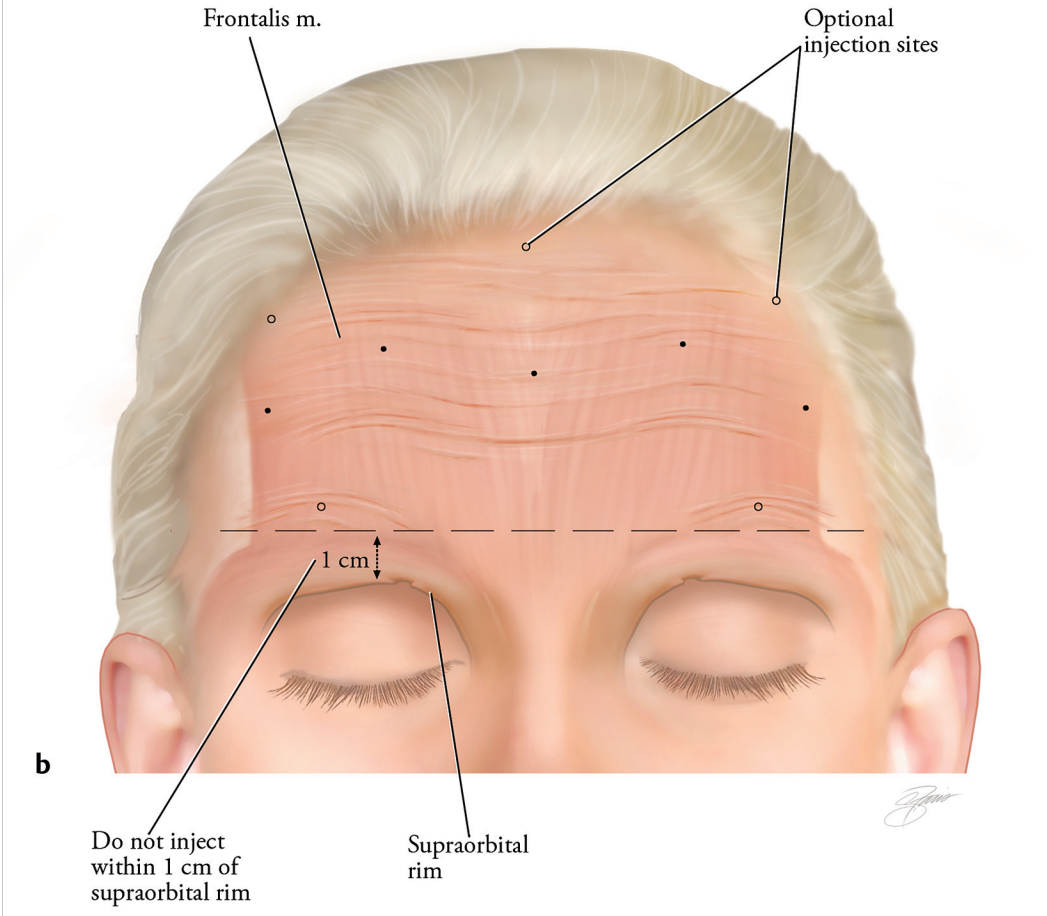


Fig. 7.1 (*continued*)

Fig. 7.2 "Mr. Spock" brow produced by central injection of the forehead.

Fig. 7.3 In some patients, care must be taken to treat the crescent-shaped rhytids superolateral to the brow.

Additional Reading

[1] Carruthers J, Fagien S, Matarasso SL, Botox Consensus Group. Consensus recommendations on the use of botulinum toxin type A in facial aesthetics. Plast Reconstr Surg. 2004; 114(6) Suppl:1S–22S

[2] Michaels BM, Csank GA, Ryb GE, Eko FN, Rubin A. Prospective randomized comparison of onabotulinumtoxinA (Botox) and abobotulinumtoxinA (Dysport) in the treatment of forehead, glabellar, and periorbital wrinkles. Aesthet Surg J. 2012; 32 (1):96–102

[3] Susmita A, Kolli NN, Meka S, et al. An evaluation of use of botulinum toxin type A in the management of dynamic forehead wrinkles - a clinical study. J Clin Diagn Res. 2016; 10(10):ZC127–ZC131

8
Neurotoxin Injection for Smile Lines and Crow's Feet

Difficulty: ●
Patient satisfaction: ●●
Risk: ●

Indications

Smile lines and crow's feet are two of the most commonly sought-after areas for treatment with BoNTA. To soften or eliminate wrinkles around the lateral and inferior orbit, injection of the orbicularis oculi muscles can prevent movement-related creasing of the overlying skin associated with expression and baseline muscle tension. Neurotoxin injection will not improve static wrinkles or deep creases due to photoaging.

Anatomic Considerations

The orbicularis oculi muscle surrounds the eye and is separated into three divisions: pretarsal, preseptal, and orbital. The orbital portion extends laterally and is intimately adherent to the overlying skin. Contraction of this muscle results in lines extending radially from the lateral canthus. As the overlying skin thins and ages, crow's feet become visible in the skin from repeated muscle contractions.

Injection Technique

Topical anesthesia may be used and ice may be applied, though neither is necessary in most cases. Three to four injections of BoNTA are placed radially in the area of the crow's feet. A total of 8 to 20 BU or 20 to 60 DU may be placed in each side. Care should be taken to inject 1 cm lateral to the bony orbital rim, especially above the canthal angle, as upper lid lag can occur. It is helpful to place a finger of the noninjecting hand at the lateral orbital rim as a guide.

The muscle is superficial, so the needle does not need to be placed deep into the subcutaneous tissue. Because of the wide zone of effect for BoNTA, a superficial dermal injection will minimize bruising without compromising clinical results.

Precautions

The periocular area often has many superficial and deep venous structures that may or may not be visible through the surface of the skin. Trying to avoid them will keep the toxin from being washed away and also prevent bruising.

Post-Injection Instructions

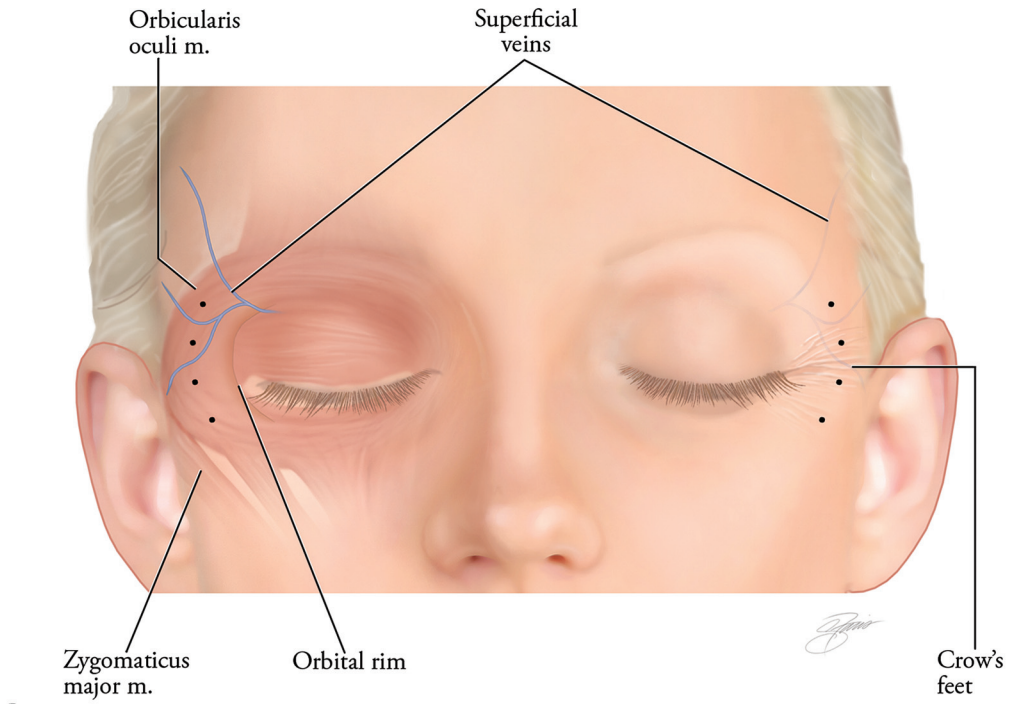
This is a highly vascular area, so bruising is possible. If a vessel is injured, hold firm pressure for a minute or two to minimize bruising. Ice packs used after injection may also minimize bruising, if necessary.

Risks

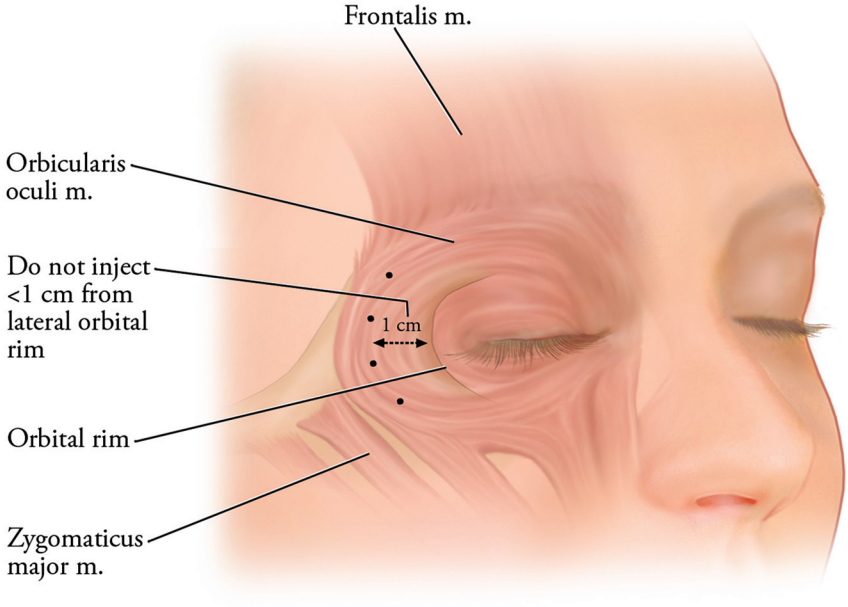
Extending the injections too far inferiorly and too deep under the orbicularis can affect the zygomaticus major muscle and result in an upper lip droop or asymmetric smile. Patients should be made aware that injections cannot be extended too inferiorly in this area. Some patients will note an accentuation of lines in this region once the lateral lines have been treated.

Pearls of Injection

- It is acceptable to have some movement with full expressive action of the muscle.
- Because of the wider zone of effect, some practitioners prefer BoNTA-ABO (Dysport) in this area.



a



b

Fig. 8.1 (**a,b**) Injections to treat the crow's feet are traditionally placed subcutaneously into the orbicularis muscle in a radial fashion 1 cm outside the lateral orbital rim. Avoid injection into the superficial veins seen in that region.

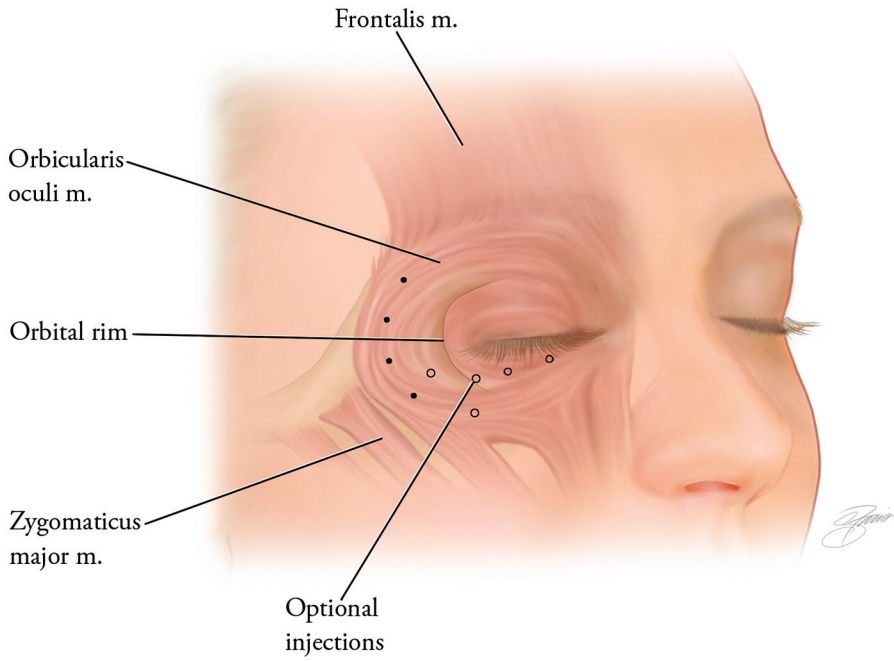


Fig. 8.2 For patients with wrinkles under the eyes, optional sites are shown, but care must be taken to avoid diffusion of BoNTA into the zygomaticus muscles.

Additional Reading

[1] Carruthers A, Bruce S, de Coninck A, et al. Efficacy and safety of onabotulinumtoxinA for the treatment of crow's feet lines: a multicenter, randomized, controlled trial. Dermatol Surg. 2014; 40(11):1181–1190

[2] Carruthers J, Fagien S, Matarasso SL, Botox Consensus Group. Consensus recommendations on the use of botulinum toxin type A in facial aesthetics. Plast Reconstr Surg. 2004; 114(6) Suppl:1S–22S

[3] Kim DW, Cundiff J, Toriumi DM. Botulinum toxin A for the treatment of lateral periorbital rhytids. Facial Plast Surg Clin North Am. 2003; 11(4):445–451

9
Neurotoxin Injection for Lateral Brow Lift

Difficulty: ●●
Patient Satisfaction: ●
Risk: ●

Indications

Hyperactivity of the lateral aspect of the orbicularis oculi muscle can result in ptosis of the lateral aspect of the brow. Vertically and obliquely oriented fibers of muscle, when activated or with baseline resting muscle tension, pull down on the position of the tail of the brow and oppose the lifting action of the frontalis muscle.

Anatomic Considerations

The orbicularis oculi muscle is a strong brow depressor. In most patients, the superolateral orbicularis oculi is positioned at or just inferior to the level of the lateral eyebrow hairs.

Injection Technique

The best effect occurs when the noninjecting hand is used to elevate the brow and injections are kept approximately 1 cm above the orbital rim. Topical anesthesia may be used but is not necessary in most cases.

BoNTA is injected into the muscle in two to three spots along the lateral brow, each with 2 to 3 BU for a total of 4 to 6 BU per side.

Precautions

Bruising is a risk in this area. The periocular area has many superficial venous structures that may or may not be visible through the surface of the skin. Bruising can be minimized by injecting into the superficial subcutaneous tissue.

Post-Injection Instructions

Hold firm pressure if bleeding occurs. Bruising is possible and more likely in this area than in many others.

Risks

There are few risks so long as the BoNTA does not affect the levator palpebrae superioris muscle.

Pearls of Injection

- Not all patients will be able to achieve significant brow elevation.
- Because brow elevation results from the upward pull of the brow by the frontalis muscle, simultaneous injection of the lateral aspect of the frontalis and the lateral orbicularis muscles will negate the upward lift of the brow in this region.

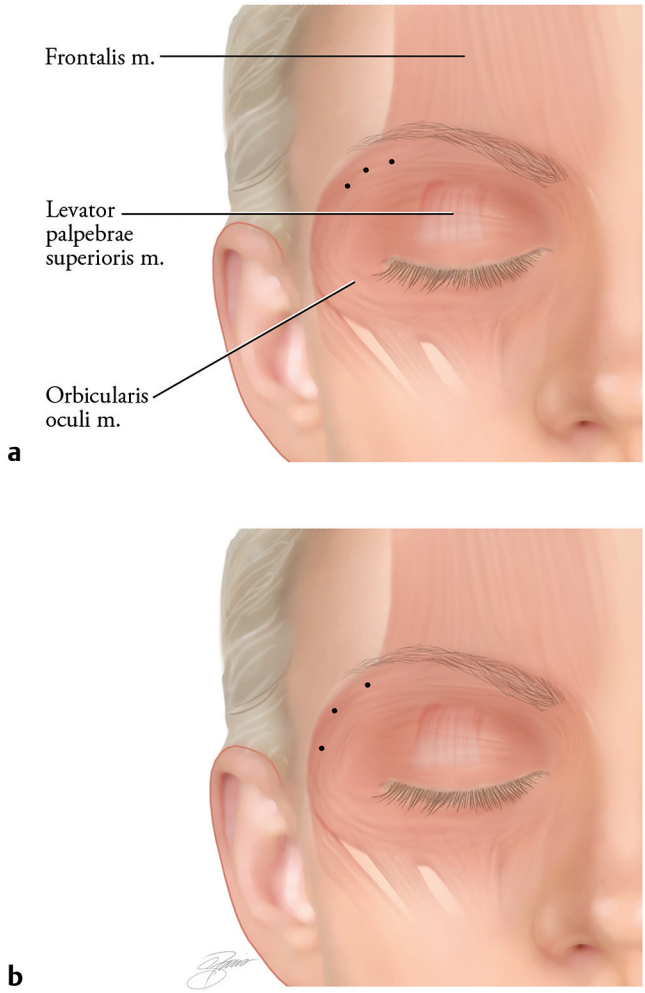


Fig. 9.1 (**a,b**) Suggested patterns of BoNTA injection of the lateral aspect of the orbicularis muscle can result in a lateral brow lift.

Additional Reading

[1] Ahn MS, Catten M, Maas CS. Temporal brow lift using botulinum toxin A. Plast Reconstr Surg. 2000; 105(3):1129–1135, discussion 1136–1139

[2] Chen AH, Frankel AS. Altering brow contour with botulinum toxin. Facial Plast Surg Clin North Am. 2003; 11(4):457–464

[3] Maas CS, Kim EJ. Temporal brow lift using botulinum toxin A: an update. Plast Reconstr Surg. 2003; 112(5) Suppl:109S–112S, discussion 113S–114S