Cosmetic Injection Techniques
A Text and Video Guide to Neurotoxins and Fillers

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Victor G. Lacombe
Contents

Foreword by Jean D. Carruthers ................................................................. x
Preface .............................................................................................................. xi

Section I  Introduction to Neurotoxins

1 Neurotoxins Overview ........................................................................... 2
2 Neurotoxin Preparation .......................................................................... 5
3 Instrumentation for Neurotoxin Injections ........................................... 6
4 The Physicians Coalition for Injectable Safety ....................................... 8

Section II  Neurotoxin Injection Techniques

5 Neurotoxin Injection for Glabellar Frown Lines .................................. 10
6 Neurotoxin Injection for Forehead Wrinkles ......................................... 16
7 Neurotoxin Injection for Smile Lines and Crow’s Feet ......................... 22
8 Neurotoxin Injection for Lateral Brow Lift ............................................ 26
9 Neurotoxin Injection for Chemical Brow Lift ........................................ 29
10 Neurotoxin Injection for Lower Eyelid Roll ........................................... 32
11 Neurotoxin Injection for Bunny Lines .................................................. 34
12 Neurotoxin Injection for Nasal Tip Lift ............................................... 38
13 Neurotoxin Injection for Nasal Flare ..................................................... 40
14 Neurotoxin Injection for Elevating the Oral Commissures ................. 42

*denotes a chapter with additional video content on MediaCenter.thieme.com*
<table>
<thead>
<tr>
<th>Chapter</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>39</td>
<td>Filler Injection for Vertical Lip Lines</td>
<td>120</td>
</tr>
<tr>
<td>40</td>
<td>Filler Injection for Glabellar Frown Lines</td>
<td>122</td>
</tr>
<tr>
<td>41</td>
<td>Filler Injection for Forehead Wrinkles</td>
<td>125</td>
</tr>
<tr>
<td>42</td>
<td>Filler Injection for Tear Trough Deformity</td>
<td>128</td>
</tr>
<tr>
<td>43</td>
<td>Filler Injection for Sunken Upper Eyelids</td>
<td>131</td>
</tr>
<tr>
<td>44</td>
<td>Filler Injection for Lateral Brow Lift</td>
<td>134</td>
</tr>
<tr>
<td>45</td>
<td>Filler Injection for Sunken Temples</td>
<td>137</td>
</tr>
<tr>
<td>46</td>
<td>Filler Injection for Nonsurgical Rhinoplasty</td>
<td>140</td>
</tr>
<tr>
<td>47</td>
<td>Filler Injection for Nasal Valve Stenting</td>
<td>146</td>
</tr>
<tr>
<td>48</td>
<td>Filler Injection for Medial Midface Hollowing</td>
<td>149</td>
</tr>
<tr>
<td>49</td>
<td>Filler Injection for Cheekbone Augmentation</td>
<td>152</td>
</tr>
<tr>
<td>50</td>
<td>Filler Injection for Sunken Cheeks</td>
<td>156</td>
</tr>
<tr>
<td>51</td>
<td>Filler Injection for Chin Augmentation</td>
<td>160</td>
</tr>
<tr>
<td>52</td>
<td>Filler Injection for the Mental Crease</td>
<td>164</td>
</tr>
<tr>
<td>53</td>
<td>Filler Injection for Jawline Rejuvenation</td>
<td>166</td>
</tr>
<tr>
<td>54</td>
<td>Filler Injection for Earlobe Rejuvenation</td>
<td>168</td>
</tr>
<tr>
<td>55</td>
<td>Filler Injection for Acne Scars</td>
<td>170</td>
</tr>
<tr>
<td>56</td>
<td>Filler Injection for Aging Hands</td>
<td>173</td>
</tr>
<tr>
<td>57</td>
<td>Filler Injection with Poly-L Lactic Acid for Facial Volumizing (Sculptra)</td>
<td>176</td>
</tr>
<tr>
<td>58</td>
<td>The “Liquid Facelift”</td>
<td>180</td>
</tr>
<tr>
<td>59</td>
<td>Management of Filler Injection Complications</td>
<td>182</td>
</tr>
</tbody>
</table>

### Appendices

A Neurotoxin/Filler Injection Techniques Arranged by Order of Difficulty and Level of Experience Required | 190  |

B Sample Informed Consent Form for Neurotoxin Injections | 192  |

C Sample Informed Consent Form for Filler Injections | 193  |

Index | 195  |
Preface

I hear and I forget.
I see and I remember.
I do and I understand.

Confucius
Chinese philosopher (551 BC–479 BC)

The number of nonsurgical facial enhancements has skyrocketed in the past 10 years. As a consequence of patient demand, many physicians, nurses, and physician assistants have begun to treat such patients. This book is 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 was 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 to identify both the targets of injection and the important structures to avoid.

The authors are aware that there is certainly more than one way to treat a certain anatomic region. It was our aim, by having authors from two very different locales (East Coast and West Coast), and different practices, that the “best” injection technique would be described by comparing our techniques of injection. In cases where our techniques markedly differed, alternate techniques are presented.

The products described in the book 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. Although the utmost care was taken in ensuring the accuracy of the dosing listed, we urge the injector to use his or her 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 different skill levels. In an attempt to promote safe utilization 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 as follows:

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

Patient satisfaction with 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, Perlane, Juvederm Ultra and Ultra Plus, Belotero, Radiesse, Sculptra, and Artefill. These products are the most commonly used fillers and neurotoxins at the time this manual was written. New products are being developed and may be available at the time of publication. However, because we have no experience with these new products, they will not be described in this edition. The experienced injectors, however, will be able to extrapolate the techniques and dosing strategies described in this book to newer products, if they desire.

Disclosure

T.C.K. is a speaker/trainer for Allergan, Medicis, and Valeant. V.G.L. is a speaker/trainer for Allergan, Medicis, and Valeant, and serves as a principal investigator for Juvederm 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.
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)
• Lyophilized
• 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)
• Lyophilized
• Stored at room temperature; refrigerate after reconstitution
Neuronox

- Approved in 2004 by South Korean Food and Drug Administration (FDA), 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
- Stored in freezer until reconstituted; refrigerate after reconstitution

Purtox

- Pending FDA approval
- Similar to Xeomin without complexing proteins

BTXA

- 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
- Minimal use cosmetically due to painful injection and limited duration
- FDA-approved only for cervical dystonia
Table 1.1 Comparison of Botulinum Toxin A Formulations

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

Abbreviation: N/A, not applicable.

Additional Reading

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 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 similar 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

Moers-Carpi M, Tan K, Fulford-Smith A. A multicentre, randomized, double-blind study to evaluate the efficacy of Onabotulinum toxinA (20 units) in the treatment of glabellar lines when compared to Incobotulinum toxinA (30 units). European Masters in Aesthetic and Anti-aging Medicine, September 30–October 1, 2011, Paris
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, FL, or Exelint International, Los Angeles, CA) 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, NJ) 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. 3.1 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. 3.2 "No Waste" syringe pushes plunger into needle hub. (Left) Acuderm, (right) Exelint.
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 Coalition for Injectable Safety (PCIS) was created to provide the public with information on qualified injectors, Food and Drug Administration (FDA)-approved materials, and information on injectable training that can be obtained by qualified professionals. We direct patients and injectors to the PCIS Web site, http://www.injectablesafety.org, for appropriate information about the safe use of injectable materials.

The PCIS is represented by over 5,000 board-certified members of the American Society for Aesthetic Plastic Surgery (ASAPS), the American Society of Plastic Surgeons (ASPS), the American Society for Dermatologic Surgery (ASDS), the American Academy of Facial Plastic and Reconstructive Surgery (AAFPRS), the American Society of Ophthalmic Plastic and Reconstructive Surgery (ASOPRS), the International Society of Aesthetic Plastic Surgery (ISAPS), the International Federation of Facial Plastic Surgery Societies (IFFPSS), and the Canadian Society for Aesthetic Plastic Surgery. We encourage professionals to utilize the PCIS Web site 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.
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.

### Indications

Neurotoxins are commonly used to treat the vertical lines between the brows. This is the only area currently Food and Drug Administration (FDA) approved for treatment with botulinum toxin A (BoNTA).

### 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.
CHAPTER 5 • Neurotoxin Injection for Glabellar Frown Lines

■ 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.

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 is no clinical data to suggest that giving patients post-treatment instruc-
tions 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 to actively move the injected muscles for 90 minutes.

Alternate Post-Injection Instructions

No exercise immediately after injection, as it 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. Tailor the treatment to the anatomy. 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. 5.1a, b  Clinical photographs of the differing anatomy of corrugators 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. 5.2a, b  Suggested patterns of injection for more horizontal corrugator supercillii 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. 5.3a, b  Suggested patterns of injection for the V-like corrugator supercilii muscles.
CHAPTER 5  ■  Neurotoxin Injection for Glabellar Frown Lines


Fig. 5.4a, b  Suggested injection sites for predominantly horizontal glabellar rhytids with more contribution from the procerus muscle and less contribution from the corrugator superciliii muscles.

■ Additional Reading