

Complications of botulinum toxin for cosmetic indications

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Mini Review

Aesthetic Medicine



The aesthetic use of botulinum toxin, often known as "Botox," has witnessed a remarkable surge in popularity over the past few decades. It has become one of the most frequently sought non-surgical cosmetic procedures, with millions of treatments administered worldwide. The epidemiology of botulinum toxin injections for aesthetic purposes highlights the substantial demand and widespread appeal of these procedures.¹

Botulinum toxin is derived from *Clostridium botulinum*, a bacterium that produces a potent neurotoxin. In aesthetic medicine, it is employed to relax facial muscles and reduce the appearance of wrinkles, fine lines, and other signs of aging. The prevalence of these procedures underscores the importance of examining complications associated with its aesthetic use, as even non-surgical interventions carry inherent risks.²

The transcendence of botulinum toxin in aesthetic medicine is multifaceted. Its appeal lies in the ability to achieve a more youthful and rejuvenated appearance with minimally invasive procedures. Patients appreciate the promise of minimal downtime and a more youthful look without the need for surgery. The aesthetic industry has evolved, and botulinum toxin injections have moved beyond a medical necessity to a lifestyle choice for many individuals.³

As botulinum toxin transcends from medical procedures to routine lifestyle enhancement, a comprehensive review of complications is imperative. Patients expect both effectiveness and safety, making it essential to recognize and address potential complications. This review aims to provide a deeper

Background

Botulinum toxin has become a popular tool in aesthetic medicine, offering effective solutions for the management of facial wrinkles. However, as its use has proliferated, concerns over complications have also arisen. This bibliographic review delves into the epidemiology, transcendence, definition, risk factors, complications, and management of botulinum toxin-associated complications in aesthetic procedures. The discussion evaluates recent research and offers insights into best practices for minimizing risks.

Keywords: Botulinum Toxin, Aesthetic Medicine, Complications, Wrinkle Management, Risk Factors.

understanding of the complications associated with botulinum toxin use for aesthetic purposes, shedding light on their epidemiology, underlying causes, and management.⁴

As we delve further into this bibliographic review, we will explore the theoretical framework behind botulinum toxin injections for aesthetic purposes, encompassing its definition, risk factors, potential complications, and strategies for effective management. By examining the complications in a detailed manner, we aim to provide practitioners, patients, and the aesthetic industry as a whole with the knowledge needed to ensure safe and satisfactory outcomes for all individuals seeking aesthetic enhancement.

Definition

Botulinum toxin, a neurotoxic protein produced by the bacterium *Clostridium botulinum*, is used in aesthetic medicine to temporarily paralyze muscles, leading to the reduction of wrinkles and fine lines. The toxin functions by inhibiting the release of acetylcholine, a neurotransmitter responsible for muscle contraction. As a result, the muscles at the injection site become relaxed, leading to a smoother appearance in the overlying skin.²

Risk Factors

A comprehensive understanding of the risk factors associated with complications in botulinum toxin injections for aesthetic purposes is essential for

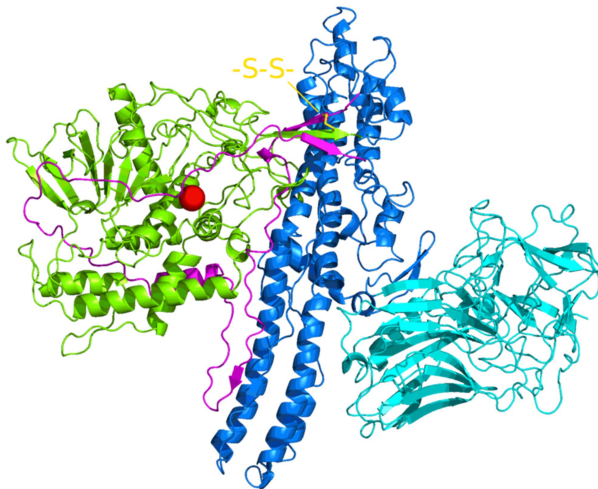


Figure 1. Botulinum toxin A1 (BoNT/A1).⁵

both practitioners and patients. Several factors contribute to the likelihood of complications:^{3,6}

Practitioner's Experience

The expertise of the practitioner administering botulinum toxin injections is a critical factor. Complications often arise when procedures are performed by inexperienced or inadequately trained practitioners. The knowledge and skills of the practitioner significantly influence the safety and efficacy of the procedure.^{3,6}

Dosage and Injection Technique

The amount of botulinum toxin used and the precision of the injection technique are pivotal to the risk of complications. Incorrect dosages or improper placement can lead to adverse outcomes.^{3,6}

Patient Factors

Patient characteristics, such as age, skin quality, and medical history, can impact the risk of complications. Patients with certain medical conditions or those taking specific medications may be more susceptible to side effects.^{3,6}

Product Variation

The use of different botulinum toxin products with varying formulations may influence the risk of complications. Understanding the specific characteristics of the product used is crucial.^{3,6}

Potential Complications^{6,7}



Figure 2. Ptosis. Drooping of the upper eyelid.^{6,7}

Complications associated with botulinum toxin injections in aesthetic procedures encompass a range of adverse effects, including:^{6,7}

Injection Site Reactions

These often include redness, swelling, and bruising at the injection site, which are typically mild and temporary.^{6,7}

Ptosis

Drooping of the upper eyelid (ptosis) is a relatively common complication, particularly when the toxin migrates to unintended areas.^{6,7}

Asymmetry

In some cases, botulinum toxin may affect one side more than the other, leading to facial asymmetry.^{6,7}

Eyelid or Brow Droop

Unintended migration of the toxin can cause drooping of the brow or eyelid, impacting the patient's appearance.^{6,7}

Unintended Muscle Weakness

In cases of excessive weakening of facial muscles, patients may experience unnatural facial expressions or difficulties with functions like speaking or chewing.^{6,7}

Management

The management of complications associated with botulinum toxin injections requires a tailored approach depending on the specific complication.⁸

Topical Creams or Cold Compresses

For minor injection site reactions, patients may be advised to use topical creams or cold compresses to alleviate discomfort and reduce swelling.⁸

Antidote (if available):

In rare cases of severe complications, an antidote may be available to counteract the effects of botulinum toxin.⁸

Patient Education

It is vital to educate patients about potential complications, emphasizing the importance of contacting their healthcare provider in the event of adverse effects. Early intervention can mitigate the severity of some complications.⁸

Follow-Up and Corrective Measures:

In cases of significant complications, follow-up appointments may be necessary. Corrective measures, such as additional injections or physical therapy, may be recommended to address persistent issues.⁸

Discussion

Emerging Complications

The widespread use of botulinum toxin for aesthetic purposes has brought to the forefront certain emerging complications. These complications include:⁶⁻⁸

Delayed Hypersensitivity Reactions: Some individuals may develop delayed hypersensitivity reactions following botulinum toxin injections. These reactions, which may manifest as redness, itching, or swelling well after the procedure, have become a topic of concern. Research is ongoing to better understand the mechanisms behind delayed hypersensitivity reactions and to identify strategies for their prevention and management.⁶⁻⁸

Persistent Muscle Weakness: While the temporary muscle weakening effect of botulinum toxin is the desired outcome in aesthetic procedures, in some cases, patients may experience persistent muscle weakness that extends beyond the expected duration. Understanding the factors contributing to this extended effect and its management are important areas of study.⁶⁻⁸

Development of Resistance: Another emerging concern is the development of resistance to botulinum toxin over time. Some patients may experience a reduced response to the treatment after multiple injections. Research is aimed at unraveling the underlying causes of resistance and developing approaches to mitigate this phenomenon.⁶⁻⁸

Preventive Strategies:

Preventive strategies play a pivotal role in minimizing the risk of complications in botulinum toxin injections for aesthetic purposes. These strategies encompass several key elements:⁹

Comprehensive Training: Practitioners must undergo comprehensive training and certification to ensure that they have the knowledge and skills required to perform botulinum toxin injections safely. Continuing education and staying updated on the latest developments are critical for maintaining high-quality care.⁹

Dosage and Injection Technique: Adherence to recommended dosages and precise injection techniques is essential in preventing complications. Practitioners must be diligent in assessing each patient's unique anatomy and requirements.⁹

Patient Assessment: A thorough assessment of each patient's medical history, skin quality, and potential risk factors is fundamental to providing safe and effective treatments. This assessment helps identify patients who may be at a higher risk of complications.⁹

Product Knowledge: Practitioners must have a deep understanding of the specific botulinum toxin product they are using, including its formulation and properties. Different products may have distinct characteristics and indications, and selecting the appropriate one for a given patient is crucial.⁹

Conclusion

The satisfaction of patients undergoing botulinum toxin injections for aesthetic purposes often hinges on the management of expectations. Practitioners must engage in open and honest discussions with patients to ensure they have a realistic understanding of what the procedure can achieve and its potential risks. Unrealistic expectations can lead to dissatisfaction and disappointment, which are best avoided through transparent communication.

In conclusion, the use of botulinum toxin for aesthetic purposes has become a widely accepted and effective method for managing facial wrinkles and fine

lines. While the procedure offers numerous benefits, it is not without potential complications. These complications, ranging from mild injection site reactions to more significant issues like ptosis or muscle weakness, require careful management.

Preventing complications is an essential aspect of safety in aesthetic procedures. Practitioners must prioritize comprehensive training, safe injection practices, and open communication with patients to ensure safe and effective treatments. The emergence of new complications and resistance to botulinum toxin highlights the ongoing need for research and a commitment to patient safety.

Managing patient expectations is equally critical in ensuring patient satisfaction. Open and honest discussions about the procedure, its potential risks, and expected outcomes can help patients make informed decisions and minimize the risk of disappointment.

As the aesthetic industry continues to evolve, staying informed about the latest developments, addressing emerging complications, and focusing on preventive measures will help maintain the safety and efficacy of botulinum toxin treatments, ensuring that patients can enjoy the benefits of these procedures with minimized risk.

Conflicts of interests

There are no conflicts of interest.

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