Comprehensive Guide to Dermal Filler Injection Training

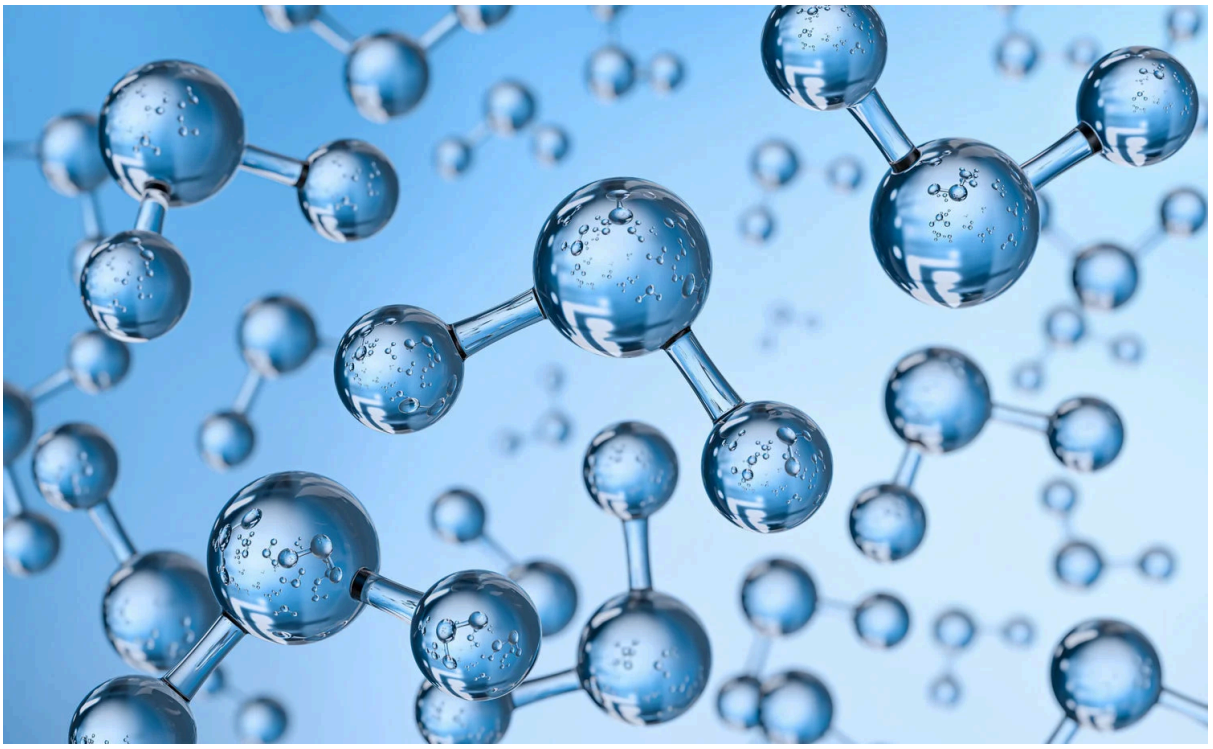
History of Dermal Fillers

The advent of dermal fillers traces back to the late 19th century, with Dr. Neuber's groundbreaking fat auto-grafting procedure in 1893. A substantial leap forward occurred in the 1970s with the development of bovine collagen, and the subsequent FDA approval of the Zyderm implant in 1983. Nevertheless, skin testing was necessary as 2-3% of patients exhibited hypersensitivity reactions to bovine collagen. The landscape of dermal fillers underwent a transformational shift in 2003 with the introduction of hyaluronic acid (HA) into the U.S. market, specifically with the product Restylane®. Since then, various HA-based fillers have dominated the aesthetic industry, including prominent brands like Juvederm, RHA, Versa, and Belotero.

Hyaluronic Acid

As a principal polysaccharide in the extracellular matrix, hyaluronic acid (HA) is instrumental in maintaining skin elasticity and fullness. Age-associated HA loss results in skin laxity and volume deficit. Crosslinked HA forms the basis of most contemporary dermal fillers, which are predominantly produced by gram-positive

bacteria. This innovative development has led to the creation of non-animal sourced hyaluronic acid (NASHA) gel.



Crosslinked HA is characterized by its remarkable versatility, facilitating the customization of its physical properties, such as hardness, lift, duration of survival, and resistance to heat and degrading enzymes. It is a stable, cost-effective, safe, and tissue-compatible biomaterial. Furthermore, HA's tissue residency is significantly prolonged due to cross-linking.

G Prime is a measure of the viscosity and elasticity of a dermal filler. It is a dimensionless quantity that is calculated using the following formula:

G' = shear stress / shear rate

Shear stress is the force that is applied to the filler to make it flow.

Shear rate is the rate at which the filler flows.

A higher G Prime value indicates a more viscous and elastic filler. This means that the filler will be more difficult to inject and will be more likely to hold its shape once it is injected.

G Prime is an important factor to consider when choosing a dermal filler. The G Prime value will affect the way the filler flows and how it holds its shape. For example, a filler with a high G Prime value would be more suitable for volumizing

and lifting, while a filler with a low G Prime value would be more suitable for filling fine lines and wrinkles.

The G Prime values for dermal fillers vary depending on the type of filler and the brand. In general, hyaluronic acid based dermal fillers have a lower G Prime value than calcium hydroxyapatite based dermal fillers.

The G Prime value of a dermal filler can affect the results of injections in a number of ways. For example:

- A filler with a high G Prime value will be more difficult to inject and may cause more pain. Conversely, a filler with a low G Prime value will be easier to inject and may cause less pain.
- A filler with a high G Prime value will be more likely to hold its shape, which can lead to longer results. Conversely, a filler with a low G Prime value will be less likely to hold its shape, which can lead to more temporary results.

Differences in Hyaluronic Acid-Based Dermal Fillers: A Deep Dive into the Restylane Family

Restylane is a comprehensive line of hyaluronic acid (HA)-based dermal fillers developed by Galderma, each with its unique properties to address different cosmetic concerns. Understanding these differences allows providers to choose the most appropriate product for each patient's unique needs. Below is a comparative exploration of Restylane products: Restylane, Restylane L, Silk, Lyft, Refyne, Defyne, Kysse, Contour, and Eyelight.

1. Restylane: Restylane is the flagship product with 20mg/ml of HA and a moderate G Prime. It's versatile, suitable for moderate-to-severe wrinkles, facial contouring, and lip enhancement. The moderate particle size provides both lifting and smoothing properties.

2. Restylane L: This is similar to the original Restylane but includes 0.3% lidocaine, a local anesthetic, for improved patient comfort during the injection. The inclusion of lidocaine doesn't alter the HA concentration or the G prime.

3. Restylane Silk: Restylane Silk contains smaller, smoother particles (around 500 microns) than its counterparts, making it perfect for subtle lip augmentation and smoothing fine lines, especially around the mouth. It also has 20mg/ml HA but a lower G prime due to its smoother consistency.

4. Restylane Lyft: Formerly Perlane, Lyft has larger gel particles and a higher G prime, offering more substantial volumizing and lifting capacity. It's excellent for enhancing cheeks and correcting volume loss in the midface. The HA concentration is 20mg/ml.

5. Restylane Refyne: Using XpresHAn technology, Refyne has a flexible gel consistency, providing subtle correction of laugh lines while maintaining natural expression. It has 20mg/ml of HA, but the G prime varies due to the crosslinking process, enhancing flexibility.

6. Restylane Defyne: Also using XpresHAn technology, Defyne has more crosslinking than Refyne, offering more support for deeper laugh lines while still allowing natural facial movement. It also contains 20mg/ml of HA.

7. Restylane Kysse: Tailored for lip augmentation and the smoothing of upper perioral lines, Kysse also uses XpresHAn technology for flexibility and naturalness. It has 20mg/ml of HA, but its unique cross-linking gives it a different G prime, ensuring longevity and a softer feel.

8. Restylane Contour: Designed specifically for cheek and chin augmentation. It uses a novel crosslinking method (XpresHAn technology), creating a product with variable G prime, allowing for excellent lift and longevity. It also has 20mg/ml of HA.

9. Restylane Eyelight: This specific filler is designed for tear troughs, with a lower HA concentration (15mg/ml) and a lower G prime. Its softer gel consistency is ideal for delicate areas like under the eyes. It also contains lidocaine for added comfort during injection.

Each Restylane product is tailored to different needs, with variations in HA concentration, G prime, particle size, and the presence of lidocaine. Some newer

products leverage XpresHAn technology for different crosslinking levels, affecting their consistency and allowing for a more natural look while maintaining volume and lift. Knowledge of these differences will enable providers to optimize treatment outcomes.

Differences in Hyaluronic Acid-Based Dermal Fillers: A Detailed Review of the Juvederm Family

The Juvederm range of dermal fillers, developed by Allergan, is well-regarded for its specialized products, each addressing different aesthetic needs. A deep understanding of their individual characteristics enables providers to select the best-suited filler for their patients. The discussion below explores Juvederm Ultra, Ultra XC, Ultra Plus XC, Voluma, Volbella, Vollure, Volux, and Skinvive.

1. Juvederm Ultra: With 24mg/ml of HA, Ultra provides versatility in treating moderate to severe wrinkles and folds, particularly nasolabial folds. Its moderate G Prime and Hylacross technology, which provides a high degree of cross-linking, offer a balance between volume and spreadability.

2. Juvederm Ultra XC: Like Ultra, Ultra XC offers 24mg/ml of HA and the same degree of cross-linking. The difference lies in the inclusion of 0.3% lidocaine, intended to increase patient comfort during and after injection.

3. Juvederm Ultra Plus XC: Ultra Plus XC has a higher G Prime than Ultra and Ultra XC due to a more robust cross-linking process, resulting in a more substantial lift and higher viscosity. It’s ideal for addressing more severe wrinkles and folds.

4. Juvederm Voluma: Voluma is tailored for deep injection in the cheeks to correct age-related volume loss. It has a high G Prime due to its proprietary Vycross technology (which involves cross-linking low and high molecular weight HA) and offers 20mg/ml of HA.

5. Juvederm Volbella: Volbella is designed for lip augmentation and correction of perioral lines. It uses Vycross technology, has a low HA concentration (15mg/ml), and a lower G Prime for a smooth consistency suitable for delicate areas.

6. Juvederm Vollure: Vollure uses Vycross technology and offers an HA concentration of 17.5mg/ml. Its moderate G Prime makes it an excellent option for moderate to severe facial wrinkles and folds.

7. Juvederm Volux: Designed for the lower face, Volux is used to sculpt the chin and jawline. It uses Vycross technology, has a high G Prime and an HA concentration of 25mg/ml, ensuring longevity and a significant lift.

8. Juvederm Skinvive: Skinvive is designed for superficial dermal injection to improve skin quality, texture, and elasticity. Its HA concentration is lower, and it includes a unique blend of antioxidants, amino acids, and vitamins for overall skin health.

In summary, the differences among the Juvederm fillers range from variations in HA concentration, G Prime, the inclusion of lidocaine, to the use of proprietary technologies like Hylacross and Vycross. The specific characteristics of each product are designed to optimize outcomes for different cosmetic needs, and a detailed understanding of these is beneficial to treating your patient.

Differences in Hyaluronic Acid-Based Dermal Fillers: A Detailed Review of the RHA Family

Developed by Teoxane Laboratories, the Resilient Hyaluronic Acid (RHA) fillers are the first dermal fillers designed for dynamic areas of the face, adapting and stretching to work with facial movements. The family consists of RHA Redensity, RHA 2, RHA 3, and RHA 4. The specific details and key differences of these products are explored below.

1. RHA Redensity: This product, also known as Teosyal Redensity (15mg/ml). Its low G Prime makes it ideal for injection into the dermis and superficial dermis of the face, for the correction of moderate to severe dynamic perioral rhytids, in adults aged 22 years or older

2. RHA 2: With an HA concentration of 23mg/ml, RHA 2 is intended to fill moderate facial wrinkles such as perioral, periorbital, or glabellar lines. It has a moderate G Prime, allowing it to balance between firmness and flexibility. The HA in RHA 2 is crosslinked with 1,4-butanediol diglycidyl ether (BDDE), which increases its viscosity and longevity.

3. RHA 3: RHA 3 also has an HA concentration of 23mg/ml but has a higher G Prime than RHA 2, making it firmer and more suited for filling severe facial wrinkles and folds, such as nasolabial folds. Like RHA 2, RHA 3's HA is crosslinked with BDDE.

4. RHA 4: This product, with 23mg/ml HA, has the highest G Prime in the RHA series and is tailored for the correction of severe wrinkles and facial contours. RHA 4 is typically used for volumizing areas such as the cheeks and contouring the jawline. Like the other RHA products, the HA in RHA 4 is crosslinked with BDDE.

One key feature of the RHA series is its “Preserved Network” technology. Unlike traditional fillers that can lose their structural integrity upon injection, the RHA series preserves the native HA structure, resulting in a more natural look and feel.

In summary, the RHA family differentiates itself by varying degrees of G Prime, while keeping the HA concentration consistent. This enables the provider to tailor the product selection based on the severity of the wrinkles and the desired level of firmness and lift. Furthermore, the unique “Preserved Network” technology enhances the fillers’ performance in dynamic facial areas.

Differences in Hyaluronic Acid-Based Dermal Fillers: A Detailed Review of Versa and Lips+

The Versa lines of hyaluronic acid-based dermal fillers are each known for their unique manufacturing processes and properties.

1. Versa: Manufactured by Prollenium, Versa is a homogenous, monophasic dermal filler that contains 24mg/ml of HA. The product is created using a proprietary wet milling technology, which produces spherical and uniform particles. These particles result in high-quality HA, reduced inflammation, and longevity. Versa has a relatively high G prime, giving it a good lifting capacity.

2. Versa+: Also part of Prollenium's portfolio, Versa+ is similar to the original Versa but includes Lidocaine for enhanced patient comfort during the procedure. Versa+ also contains 24mg/ml of HA and has the same manufacturing process, properties, and G prime as Versa.

3. Lips+: Specifically designed for lip augmentation, Lips+ is another Prollenium product with 24mg/ml of HA.

Differences in Hyaluronic Acid-Based Dermal Fillers: A Detailed Review of Belotero Products

Here we'll explore the specific details and key differences between Belotero Balance, and Belotero Balance Plus.

1. Belotero Balance: Manufactured by Merz Aesthetics, Belotero Balance is unique due to its Cohesive Polydensified Matrix (CPM) technology, which produces a smooth, flexible gel. Belotero Balance has 22.5mg/ml of HA and a moderate G prime that offers a balance between lift and spread. This filler is suitable for moderate lines and wrinkles.

2. Belotero Balance Plus: Belotero Balance Plus is similar to Belotero Balance but contains 0.3% lidocaine hydrochloride to reduce pain on injection.

Combined List of Contraindications

- Dermal fillers are contraindicated for patients with severe allergies manifested by a history of anaphylaxis, or history or presence of multiple severe allergies.
- Dermal fillers, which contain trace amounts of gram-positive bacterial proteins, are contraindicated for patients with a history of allergies to such material.
- Dermal fillers should not be used in patients with previous hypersensitivity to local anesthetics of the amide type, such as lidocaine.
- Dermal fillers should not be used in patients with bleeding disorders.
- Dermal fillers are contraindicated for use by anyone with a skin infection or a susceptibility to keloid formation or hypertrophic scarring.
- Dermal fillers should not be used by pregnant women or nursing mothers.
- People under the age of 22 should not be treated with certain types of dermal fillers.
- Patients with evidence of scars at the intended treatment sites should not be treated with dermal fillers.
- Patients with acne and/or other inflammatory diseases of the skin should not be treated with dermal fillers.
- Patients with unattainable expectations should not be treated with dermal fillers.
- Dermal fillers should not be used in patients who have plans to undergo desensitization therapy.
- Dermal fillers should not be used in patients with acute or chronic skin disease in or near the injection sites, or with any infection or unhealed wound of the face.
- Patients under concomitant anticoagulant therapy, antiplatelet therapy, or with a history of coagulation defects or connective tissue disorders should not use dermal fillers.
- Dermal fillers are not intended for intravascular use and must not be injected into blood vessels, as implantation into dermal vessels may cause vascular occlusion, infarction, or embolic phenomena.
- Dermal fillers should not be used in conjunction with a laser, intense pulsed light, chemical peeling or dermabrasion treatments, or with over-the-counter (OTC) wrinkle products or prescription wrinkle treatments within 4 weeks (28 days) prior to treatment.

Please note that this list is a combination of all contraindications from each product, and each individual product may not have every listed contraindication. Always refer to the specific product’s package insert.

Warnings

This is a consolidated list of all the specific warnings.

- Avoid injecting dermal fillers directly into blood vessels, as this may cause vessel occlusion, embolization, or infarction.
- Rare but serious adverse events associated with the intravascular injection of soft tissue fillers in the face have been reported and include temporary or permanent vision impairment, blindness, cerebral ischemia or cerebral hemorrhage, leading to stroke, skin necrosis, and damage to underlying facial structures.
- Use of these products on patients who are pregnant, breastfeeding, or under 18 years old has not been studied, and therefore is not recommended.
- The safety and effectiveness of these products for treatment in areas other than those specified in their respective FDA-approved labeling have not been established.
- Do not overcorrect (overfill) a contour deficiency because the depression should gradually improve as treatment continues.
- Do not mix these products with any other products before implantation.
- As with all skin injection procedures, there is a risk of infection.
- Injections of greater than 1.5 mL per lip (upper or lower) per treatment session significantly increases the occurrence of the severity of lip swelling.
- Dermal fillers should not be used in areas that have high vascularity as there is a risk of vascular embolization.
- Injection site reactions (for example: redness, temporary swelling, tenderness, or pain) have been observed and are short term in duration (less than seven days). Any reactions in excess of this anticipated reaction should be reported to a healthcare professional.
- If immediate blanching occurs, the injection should be stopped, and the area massaged until it returns to a normal color. Blanching may represent a vessel occlusion. If normal skin coloring does not return, do not continue with the injection.
- Patients should receive prompt medical attention and possibly evaluation by an appropriate healthcare practitioner specialist should an intravascular injection occur.
- This product should only be used by healthcare practitioners who have appropriate training, experience, and who are knowledgeable about the anatomy at and around the site of injection.
- Patients with adverse inflammatory reactions that persist for more than one week should report this immediately to their doctor.
- Health care practitioners are encouraged to discuss all potential risks of soft tissue injection with their patients prior to treatment and ensure that patients are aware of signs and symptoms of potential complications.
- Serious adverse events have been reported related to the use of dermal fillers in the area of the eye.

- Localized superficial necrosis and scarring may occur after injection in or near vessels, such as in the lips, nose, or glabellar area. It is thought to result from the injury, obstruction, or compromise of blood vessels.
- Delayed onset inflammatory papules have been reported following the use of dermal fillers. Inflammatory papules that may occur rarely should be considered and treated as a soft tissue infection.

These warnings provide important information for safe and effective use of dermal fillers and should be carefully considered by healthcare providers and patients alike. It is essential to reach out to the respective product manufacturers or healthcare providers for additional information.

Precaution

- Dermal fillers are intended for single use only. They should not be resterilized or used if the package is opened, damaged, or past its expiration date.
- The product should be used with caution in patients undergoing immunosuppressive therapy or patients who are using substances that reduce coagulation.
- The injection of dermal fillers into patients with a history of herpetic eruptions may lead to reactivation of the herpes.
- The patient should be informed that they should minimize exposure of the treated area to excessive sun or heat, UV lamp exposure, saunas, and extreme cold weather until any initial swelling and redness have resolved, and puncture sites have healed.
- Any syringe that shows signs of content separation or appears cloudy should not be used.
- If nodules or persistent papules occur, consider appropriate treatment, such as hyaluronidase injection or surgical removal.
- Prior to treatment, the patient should avoid taking aspirin, nonsteroidal anti-inflammatory medications, St. John’s Wort, or high doses of Vitamin E supplements, as these agents may increase bruising and bleeding at the injection site.

Aging Skin

The process of skin aging encompasses numerous interconnected and complex changes that occur within the skin and underlying tissues. These changes are typically observed as loss of subcutaneous volume, thinning of the skin, and modifications in bony structures, all of which contribute to the deterioration of youthful facial contours. Additionally, aging skin is characterized by a reduction in collagen and elastin, proteins integral to maintaining the skin’s elasticity and

firmness. This loss, coupled with the relentless tug of gravity, results in skin laxity and a downward shift of the skin and underlying tissues.

Dermal landmarks of aging skin include the pronounced laugh lines and marionette lines, a clear depiction of the loss of subcutaneous support. The lips, once plush and rounded, become thin, flat, and deflate, losing their characteristic curvature and fullness. The emergence of vertical lines both above and below the lips, often termed as ‘smoker’s lines’, become increasingly visible. The oral commissures, or corners of the mouth, gradually turn downward, giving the face a perpetual frown.

Consultation

The crux of a successful practice hinges upon comprehensive patient selection and education. Often, patients tend to confuse neurotoxins like Dysport® or Botox® Cosmetic with Dermal Fillers, erroneously assuming they serve the same purpose. It is incumbent upon the medical practitioner to elucidate the fundamental differences between these two treatment options, particularly when a patient requests inappropriate treatments, such as Dysport® injections in the lips to enhance fullness.

Start your consultation by acquiring a full medical history and conducting a physical examination to rule out potential contraindications. This includes probing for any underlying health conditions or allergies that could impede the successful administration of dermal fillers.

Next, ask the patients about the specific areas they wish to correct or enhance. Assess these areas: nasolabial folds, marionette lines, smile lines, lips, and perioral lines, or vertical lines around the mouth. It’s also crucial to guide the patient through the process. Instead of pointing out perceived flaws, demonstrate the beneficial effects of dermal filler treatment.

Evaluate the depth and severity of wrinkles by performing a stretch test, using your thumb and index finger to see if the wrinkle can be flattened. Not all folds can be completely corrected due to excess sagging tissue or scar tissue, so it’s crucial to set patient expectations appropriately.

Timing of the treatment is another vital consideration. It is generally not recommended to initiate a new treatment, such as lip augmentation with Restylane, close to a major event like a wedding, especially if the patient has never had the treatment before.

Discuss the potential need for touch-ups in the future, the cumulative costs, and their pain tolerance. Offer information about various pain control options available.

Practitioners should strive to foster a rapport with their patients, taking the time to listen, educate, and set realistic expectations. Some patients may have unrealistic treatment expectations, desiring too many areas to be treated with one syringe, which would lead to suboptimal results. In such cases, it might be preferable to defer treatment rather than risk dissatisfaction.

Pre-Injection Checklist

Prior to any dermal filler injection, following a systematic pre-injection checklist ensures a smooth and safe procedure.

1. Photography: Maintain a photographic record of the patient's pre-injection features. This documentation aids in managing any misdirected blame regarding treatment results.

2. Asymmetry Evaluation: Assess for any pre-existing asymmetry. If the patient desires a symmetrical result, ensure sufficient product quantity to treat each side evenly.

3. Pain Management: Offer a topical anesthetic or ice to cool and numb the area before injection to improve the patient's comfort.

4. Cleanliness: Thoroughly cleanse the area with alcohol wipes to minimize the risk of infection.

5. Proper Equipment: Always use the needle provided by the vendor and ensure it is fully seated to the hub. This reduces the chance of needle disengagement from the syringe and prevents product waste or accidental spills.

6. Needle Position: Orient the eye of the needle upwards towards the skin surface, ensuring accurate and safe product delivery.

7. Air Purge: Push the plunger until a droplet appears at the tip of the needle, removing any air that might be inside the needle hub.

8. Preventive Measures: For patients with a history of cold sores, consider pretreatment with antiviral medication, as any injection around the mouth can trigger a recurrence.

Injection

Dermal filler injections require a meticulous technique to achieve optimal results and minimize complications. Always insert the needle into the middle to deep dermis for appropriate product placement. You can gently stretch the skin to aid needle insertion, which also helps visualize the treatment area better.

The contour of the needle should be barely visible or not at all, depending on the type of filler used and the severity of the wrinkle being treated. If utilizing a threading technique, apply even pressure on the syringe plunger while slowly retracting the needle. Ensure you stop the injection before completely removing the needle to prevent the product from oozing out or a superficial placement.

Superficial injections can cause a bluish hue on the skin due to the Tyndall effect. If this occurs, consider massaging the product deeper into the tissue, expressing it out, or dissolving with Hyaluronidase.

In fanning technique, keep the needle inside the skin while angling the syringe and reinserting the needle to the hub. Be aware of the potential for intravascular injection. If blanching occurs, immediately stop injecting and massage the area until normal skin color returns.

Throughout the procedure, you should always feel the resistance of the dermis, indicating correct plane injection. If you encounter too much or too little resistance, you may be in the wrong plane. At the end of the treatment, the injected wrinkle should be visibly lifted and filled.

Post Injection

After administering the dermal filler, a careful evaluation is critical to ensure an optimal result. The treated area should feel smooth with no detectable empty spaces or lumps. Strive for a precise correction – neither under nor overcorrect.

Gently massage the injection site to blend the product with surrounding tissue. If you feel any bumps or lumps, massage them until they flatten. In most cases, any protrusions will resolve naturally, but reassure the patient and schedule a follow-up appointment within a week. If a lump persists at this follow-up, consider using Hyaluronidase to dissolve the filler.

Symmetry assessment immediately post-injection can be challenging due to localized swelling and bruising. Invite the patient back after a week for re-evaluation once the swelling has subsided.

Lastly, any post-injection swelling or internal bruising should resolve in a few days. To minimize these side effects, provide your patient with an ice pack, which can also help to reduce potential bleeding.

This comprehensive approach to patient consultation, preparation, and treatment will facilitate optimal results when using dermal fillers like Restylane, Juvederm, RHA, Versa, and Belotero, and ensure your patients are satisfied with their treatments.

Injection Technique

The success of dermal fillers is not only dependent on the type of product used but also on the technique of injection. There are various injection techniques, each with its own set of advantages and potential pitfalls.

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Serial Puncture

The serial puncture technique involves multiple, closely spaced injections along a wrinkle. The key to this technique is the precise placement of the filler. If the filler is not accurately placed, gaps may be found between the injection sites. This technique is less desirable due to the multiple puncture wounds it generates. However, it can be effective for treating fine lines and wrinkles, provided that the practitioner has a steady hand and a keen eye for detail.

Linear Threading

Linear threading is a technique where the needle is fully inserted into the wrinkle up to the hub and the product is injected along the track as the needle is gradually withdrawn. This technique requires continual pressure and even distribution of the product. It is crucial to stop the injection several millimeters before completely removing the needle from the skin to avoid superficial placement or leakage of the product above the skin.

Some practitioners prefer the push-ahead technique, where the product is injected as the needle is being advanced through the skin. This requires a certain level of skill and dexterity, as the practitioner must simultaneously push the plunger of the syringe while pulling back the syringe from the skin. With practice, this technique can be mastered and can provide a smooth, even distribution of the filler.

Cross Hatching

Cross hatching is a technique that involves injecting a series of parallel linear threads at 5 – 10 mm apart, followed by a perpendicular series of parallel linear threads at the same distance. This creates a grid-like pattern and is particularly useful for adding volume to a larger area or when multiple wrinkles are close in proximity. The cross-hatching technique allows for a more uniform distribution of the filler, resulting in a more natural-looking result.

Fanning

The fanning technique involves puncturing the epidermis once, as in the linear threading technique, and before the needle is completely removed from the skin, the needle is moved in a fan pattern to create a triangular shape. Additional evenly spaced fanning injections may be performed without removing the needle from the skin, depending on the size of the triangular area to be filled. Care must be taken to avoid over-injecting at the proximal end of each “fan” as this can result in an overlap of the product in one region.

Ferning

Ferning is a technique that involves short linear threading perpendicular to the fold, followed by advancing a few millimeters away from the fold in either direction. This technique is typically used on dynamic facial lines that require stiffness of the skin on either side of the wrinkle. The ferning technique can provide a more structured support to the skin, helping to smooth out dynamic lines and wrinkles.

Nasolabial Folds: Anatomical, Injection, and Post-Injection Considerations

The nasolabial fold is a noticeable line or crease that extends from the lateral border of the nostril to the corner of the mouth, a signifier of facial aging.

The formation of the nasolabial folds occurs due to several anatomical changes with age, such as the gradual medial and inferior movement of the malar fat pad caused by collagen loss and diminished skin elasticity. A heavy mid-face, as seen with aging or obesity, might amplify the depth of these lines.

For the provider, it’s essential to understand the intricate anatomy of the nasolabial fold area. It consists of five layers: skin, subcutaneous fat, superficial musculoaponeurotic system (SMAS), facial muscles (like levator labii superioris, zygomaticus minor, and major), and the periosteum of the maxilla. The vascular structures around this area include the facial artery, angular artery, and infraorbital artery. As the facial artery runs near the nasolabial fold, always aspirate before injecting to avoid intravascular injection and subsequent complications.

When treating nasolabial folds, the choice of dermal filler is critical. Older patients with deeper folds might need a higher G Prime filler – G Prime refers to the elasticity or firmness of the filler. Higher G Prime fillers can create lift and sustain their form under pressure, which is beneficial in areas where a more substantial correction is required.

The injection technique varies depending on the fold's depth. For shallow to medium folds, linear threading with fanning is typically used. This involves a retrograde injection technique, wherein the needle is inserted at the lower part of the nasolabial fold and advanced superiorly towards the nose, depositing 0.05 to 0.1 mL of the filler per injection. Fanning, a technique where injections are administered in a starburst or radial pattern, is particularly useful at the upper Y-shaped area beneath the naris and lateral to the ala.

However, when progressing inferiorly towards the oral commissure, the correction duration tends to decrease due to increased muscular activity. Also, the correction here may be challenging due to the lack of underlying bone and the gravitational effect on cheek tissue.

Following the injection, the provider should mold the filler to ensure optimal distribution and smoothness. This is accomplished by placing a gloved thumb on top of the treated fold and one or two fingers inside the mouth, then gently molding along the injection site to check for nodules or lumps. HA fillers are particularly amenable to molding due to their malleability.

However, while treating nasolabial folds, multiple superficial lines lateral to the fold might tempt an injector. These lines are often a result of dynamic facial expressions and should be addressed cautiously, as treating these might lead to visible filler implants during facial movements, which may appear as cord-like structures on the face.

Post-procedural monitoring is crucial, and patients should be educated about potential complications such as swelling, redness, pain, bruising, lumps, skin necrosis, and even rarer complications like blindness due to accidental intra-arterial injection. Additionally, patients should avoid vigorous physical activities, exposure to intense heat or cold, and alcohol for the first 24 hours post-procedure to minimize risks and enhance recovery.

Remember, while hyaluronic acid fillers provide an effective, minimally invasive approach to correct nasolabial folds, patient safety and aesthetic results should always be the primary considerations. Therefore, a thorough understanding of facial anatomy, injection techniques, and product characteristics are prerequisites to performing these procedures safely and effectively.

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Oral Commissures: Anatomical, Injection, and Post-Injection Considerations

The oral commissures, or the corners of the mouth, concern patients as they can begin to descend with aging, lending a melancholic or “sad” appearance. This phenomenon occurs due to a combination of factors such as fat atrophy, dermal thinning, and gravitational effects, along with the actions of the depressor anguli oris muscle, contributing to the downward turn.

The anatomy of the oral commissures includes important structures such as the orbicularis oris muscle, the depressor anguli oris muscle, the depressor labii inferioris, and the mentalis muscle. Surrounding vascular structures include the superior and inferior labial arteries, which arise from the facial artery. A detailed knowledge of these structures is crucial to avoid inadvertent intravascular injection, which can lead to serious complications.

Treatment aims at restoring volume to the marionette lines and lifting the corners of the mouth, thereby restoring a more youthful and refreshed appearance. The choice of dermal filler is critical. Fillers with high G Prime are often preferred for their robust lifting capacity and longevity.

The choice of injection technique depends on the extent and depth of the oral commissure depression. Deep depressions may necessitate a serial puncture technique, a method that involves injecting small aliquots of the filler at different levels within the depression. This technique is preferred for its ability to provide volume and support at different tissue levels. On the other hand, shallow, longer grooves might benefit more from linear threading, a technique that involves a continuous injection of the filler while the needle is slowly withdrawn.

The injection often extends down into the melomental fold, also known as the marionette lines, particularly in older patients. This is due to the shared etiology of aging changes between the oral commissures and the melomental folds.

A useful tip for injectors is to request the patient to open their mouth slightly, which can help relax the surrounding muscles and facilitate easier filler placement. Be mindful of injecting too superficially to avoid the Tyndall effect, a bluish discoloration that occurs when filler is placed too close to the skin surface.

Typically, the injection volume ranges from 0.05mL to 0.1mL per injection. Be aware that augmentation in the mouth corners may not persist as long as in other facial areas due to the high muscular activity in this region.

Post-injection, the injector should gently mold the filler to ensure optimal distribution and smoothness. The HA fillers are malleable and can be molded to achieve a more

natural-looking result. The patients should be advised to minimize excessive facial movements, such as extreme smiling or frowning, in the first 24-48 hours to prevent displacement of the filler.

Possible complications that patients should be educated about include bruising, swelling, redness, pain at the injection site, asymmetry, and lumps or nodules. More serious but rarer complications include vascular occlusion, infection, and granuloma formation. In case of vascular occlusion, the area should be immediately massaged, warmth applied, and hyaluronidase injected to dissolve the filler.

In summary, rejuvenating the oral commissures with HA fillers requires a comprehensive understanding of the anatomical structures, injection techniques, filler characteristics, and possible complications to achieve safe and satisfactory results.

Melomental Fold: Anatomical and Procedural Nuances

The melomental fold (MMF), also known as the marionette line, extends inferiorly from the oral commissure towards the mandible, reflecting one's age or emotional expressions, such as sourness or anger. The MMF's prominence arises due to collagen and elastin loss, gravitational descent of facial tissues, and bony resorption, all of which are hallmarks of facial aging.

MMFs can present as a single line when viewed frontally. However, a three-dimensional perspective, achievable by looking superiorly from a lower point, may reveal a deepened groove or a delta. This is an essential observation for determining the most suitable injection technique.

For more advanced MMFs, linear threading or serial puncture might fall short in providing a satisfactory result. Instead, constructing a scaffold-like support using a fanning or cross-hatching technique might be more beneficial. These techniques offer structural support and create a lifting effect, contributing to a more youthful facial contour.

The injector should aim for the deep dermis when treating MMFs. The injections should progress from the inferior to the superior direction vertically, and medially to laterally in a horizontal fashion. This approach reduces the risk of inadvertently injecting into the facial vein, which lies laterally to the MMF.

Layering can be beneficial for deep MMFs, with the initial layer providing a scaffolding effect, and subsequent layers achieving the desired volume. A high G Prime filler may be particularly beneficial in this region due to its structural integrity and volumizing effect. Research suggests injections should deliver 0.05mL to 0.1mL

per pass, avoiding excess filler placement, which can lead to complications such as lumping or over-correction.

One must exercise care to prevent inadvertent injections into the lower lip, which may result in unwanted lip augmentation or palpable lumps. It's recommended to palpate the area post-injection and smooth any palpable nodules.

In terms of patient comfort, injectors should note that MMF injections are often more painful than injections into other facial regions, like the nasolabial folds. Providers can consider offering topical anesthetics or using fillers containing lidocaine to improve patient comfort.

Potential complications of MMF injections include swelling, bruising, infection, asymmetry, nodules, and granulomas. More severe, though rarer, complications include vascular occlusion, skin necrosis, and hypersensitivity reactions. A rapid response to vascular occlusion with hyaluronidase is essential to prevent skin necrosis.

In conclusion, HA filler injections into the MMF present a powerful tool for facial rejuvenation. However, a deep understanding of the anatomical and procedural intricacies, coupled with a thorough knowledge of potential complications, can enhance treatment outcomes and patient satisfaction.

Lip Augmentation: The Art of Balance and Precision

The lips, reaching their peak volume by the mid-30s, represent a hallmark of beauty and youthfulness. However, with age, features such as the vermilion border, philtral ridge, and cupid's bow undergo changes including thinning, drooping, and flattening, respectively. The upper lip often becomes thin and elongated, whereas the lower lip thins and rolls inwards. Simultaneously, the orbicularis oris muscle's activity contributes to radiating perioral lines, commonly referred to as "lipstick lines."

Achieving a natural, balanced augmentation of the lips is a complex task requiring a thorough understanding of facial proportions, anatomy, and the unique characteristics of dermal fillers. When discussing proportions, it's generally accepted that the lower lip should be fuller than the upper, with an ideal ratio of 1:1.6 according to the Fibonacci sequence.

The clinician's approach must be nuanced according to the patient's age. Younger individuals typically seek enhancement of size and shape. While even small volumes of filler (0.1 – 0.3mL) can significantly enhance the lips' appearance, caution should be exercised to prevent the undesirable "duck lip" appearance.

Older patients, in contrast, generally wish to restore their lips to their previous state rather than increasing size. Such patients may not desire lip eversion or an unnatural appearance and might require adjunctive treatments like laser resurfacing or chemical peels for perioral wrinkling or deep lipstick bleeding.

Pain during the procedure can be managed using HA products containing lidocaine, nerve blocks, or topical anesthetics. However, if nerve blocks are used, it's crucial to work promptly as the numbness can distort the lip position.

In terms of injection techniques, threading is recommended for minimizing puncture sites. The vermilion border and the wet-dry junction are common targets for lip volume enhancement. To increase lip size and provide lift and contour, the needle should be inserted 1-2mm from the vermillion border towards the mucosa border, creating a "ski jump" appearance. However, overfilling near the vermilion border should be avoided to prevent the "duck-like" appearance.

When focusing on volume enhancement, the needle should be inserted 3-5mm from the vermillion border near the wet-dry border, which will plump up the lips without everting the edges.

For enhancing the philtral column, the needle should be inserted at the junction of the Cupid's bow and philtral column, advancing superiorly.

Vertical lip lines can be managed by direct injection into the lines or along the vermilion border. Care should be taken to use minimal amounts to prevent overcorrection and unnatural bulging.

As the lips are a focal point of the face, precision is paramount. Overcorrection or asymmetry can be glaringly apparent. In addition, the lips' rich vascularity makes them prone to complications such as bruising and swelling. It's recommended to apply ice post-procedure to mitigate these immediate side effects and to ensure equal amounts of filler are administered.

Additionally, due to their high G-prime, fillers such as Juvederm Voluma or Restylane Lyft are generally avoided in lips, favoring softer fillers such as Juvederm Volbella or Restylane Silk, to avoid lumpiness and provide a softer, more natural feel.

Potential complications include not only immediate post-treatment swelling and bruising but also longer-term problems such as lumps, bumps, asymmetry, or, more seriously, vascular occlusion. In the case of vascular occlusion, immediate management with hyaluronidase is critical.

In conclusion, HA dermal filler injection in the lips requires a deep understanding of lip anatomy, precise injection techniques, and careful patient selection and

counseling. A conservative approach with a focus on balance and proportion can yield the most satisfying and natural results.

Peri-Oral (Smoker's Lip Lines) Dermal Filler Injection

Peri-oral lines, often referred to as "smoker's lines" or "lipstick lines," are common concerns for many older patients and smokers. These vertical, radial lines extending from the vermillion border are typically the result of collagen loss, habitual muscle contraction of the orbicularis oris muscle, and environmental factors such as sun exposure and smoking. Dermal filler injections, predominantly with hyaluronic acid (HA) fillers, offer an effective treatment to improve these lines.

Anatomy

The peri-oral region consists of several anatomical layers: skin, subcutaneous tissue, orbicularis oris muscle, and the underlying skeletal structure. Understanding the dynamic interplay between these structures is key to achieving a natural-looking result while minimizing potential complications. It's also important to be aware of the location of the superior and inferior labial arteries, which provide blood supply to the lips, to avoid inadvertent vascular occlusion.

Warnings

In the peri-oral region, care must be taken to avoid overcorrection, which can lead to an unnatural fullness and alter the natural curvature of the lips. Overcorrection can also cause the formation of bumps or lumps, which can be aesthetically displeasing. The treatment should aim to restore natural lip definition rather than enhancement.

Consider additional treatments like laser resurfacing, chemical peels, or botulinum toxin injections in patients with significant photodamage, dynamic lines, or poor skin texture.

Injection Technique

1. For Fine Wrinkles: Inject along the course of the wrinkles vertically, using 0.025ml – 0.05ml per injection. Insert the needle at the wrinkle/lip junction in the vermillion border and orient it along the wrinkle. This reduces the risk of inadvertently injecting the product into the lip but may increase the risk of bruising.

2. For Deep Wrinkles: Implement a cross-hatching technique, using vertical and horizontal placement of the product (0.05ml per injection). It's essential to avoid overcorrection to prevent the formation of bumps or an unnatural fullness.

3. Post-Injection Molding: Use your thumb and index finger to guide and mold the product after injection, applying firm pressure to smooth out the filler and ensure that the wrinkle is not overcorrected.

Complications

The most common complications include bruising, swelling, and lumpiness. In rare cases, intravascular injection can occur leading to vascular occlusion. Therefore, a good understanding of the vascular anatomy is crucial. Overcorrection can lead to an unnatural appearance, dubbed “Homer Simpson” lips.

In conclusion, HA-based dermal filler injections can be an effective treatment for peri-oral or smoker’s lip lines, but require a deep understanding of the underlying anatomy, skilled technique, and an aesthetic eye to achieve a natural and pleasing outcome. Providing patients with realistic expectations and discussing potential adjunctive treatments can also contribute to increased patient satisfaction.

Cheek Augmentation

The injection of hyaluronic acid-based dermal fillers in the cheeks is a non-surgical procedure used to rejuvenate or augment the facial aesthetic. It’s imperative to understand the facial anatomy, injection technique, and potential complications to provide safe and effective treatment.

Anatomy:

The cheek area is complex and involves multiple anatomical layers, including the skin, subcutaneous fat, the superficial musculoaponeurotic system (SMAS), and deep fat compartments. There are three fat compartments in the cheek: medial, middle, and lateral, each presenting different aging signs. The zygomatic and buccal branches of the facial nerve are also located in this area and are crucial to avoid during injection. The infraorbital artery, a branch of the internal carotid artery, supplies this region. The artery’s course should be kept in mind during injections to avoid intravascular complications.

Warnings:

While dermal fillers have an impressive safety profile, complications can occur, especially if proper injection techniques are not used. Intravascular injection and compression of vessels can lead to vascular occlusion, necrosis, or even blindness. Therefore, thorough knowledge of the vascular anatomy is vital.

Injection technique:

The injection technique depends on the desired aesthetic outcome. However, a common approach is injecting the filler deep, either sub-muscular or at the periosteal

level, to provide lift and projection. Using a cannula instead of a needle may minimize the risk of vascular compromise.

Firstly, the midface is divided into three aesthetic units: zygomatico-malar, submalar, and anterior cheek. The filler is typically injected in the zygomatico-malar area for volumizing and in the anterior cheek for contouring. The injection should start from the zygomatic arch, moving medially towards the nasolabial fold, and then downwards towards the mandible. The sub-malar area requires expert technique as this area lack the boney support and the transverse facial artery courses underneath the zygomatic arch.

A typical bolus technique is used, injecting the filler as the cannula or needle is withdrawn to reduce the risk of intravascular injection. In addition, the supraperiosteal space is the preferred plane of injection as it provides an even distribution of filler, reduces the risk of contour irregularities, and limits filler migration.

The amount injected:

The amount of dermal filler injected varies according to the individual patient's needs and the desired result. Generally, 0.5 to 1 mL of filler per side is a reasonable starting point. However, it's crucial to reassess the patient's face after each injection to avoid overcorrection.

G Prime:

The G prime of a filler represents its firmness or ability to resist deformation and is crucial in choosing the appropriate filler for each facial area. For cheek augmentation, a filler with a high G prime such as Juvederm Voluma or Restylane Lyft is preferred as they provide substantial lift and projection.

Complications:

As mentioned earlier, potential complications include vascular occlusion, necrosis, and blindness if filler is inadvertently injected into blood vessels. Additionally, improper injection technique can lead to contour irregularities, nodules, or granulomas. Overcorrection is another common problem, leading to an unnatural aesthetic outcome.

Pearls:

1. A thorough understanding of facial anatomy and the desired aesthetic outcome is key to successful treatment.

2. Choose a filler with a high G prime for cheek augmentation for optimal results.

3. Always inject slowly and in small aliquots, reassessing the face after each injection to avoid overcorrection.

4. Use a cannula instead of a needle whenever possible to minimize the risk of vascular compromise.

5. Always have hyaluronidase readily available in your clinic to manage vascular complications promptly.

In conclusion, HA-based dermal filler injections in the cheeks provide a minimally invasive option for facial rejuvenation and contouring. However, successful treatment requires careful patient selection, meticulous injection technique, knowledge of facial anatomy, and the ability to manage potential complications.

Enhancing Complication Management in Hyaluronic Acid Based Dermal Filler Injections

Complications can be broadly divided into early and delayed based on the time of occurrence, and minor and major based on the severity.

Early Minor Complications

Early minor complications, such as bruising, pain, edema, and erythema, can occur immediately or within a few hours post-injection. They generally resolve within a week. The majority of patients might experience at least one of these localized injection site reactions, and it’s essential to inform patients about these potential side effects before the procedure.

To minimize pain, especially in highly innervated sites like the lips, pre-treatment with topical anesthetic or ice is recommended. Avoiding anticoagulants and nonessential supplements pre-procedure can also reduce the risk of post-injection ecchymosis. Arnica, a homeopathic ointment, is often used to reduce ecchymosis. Its active ingredient, helenalin, has demonstrated anti-inflammatory effects, but clinical studies remain inconclusive.

Further minor complications like asymmetry, lumpiness, or bluish discoloration, often result from suboptimal injection techniques. Incorrect filler placement can lead to nodules or papules, and superficially implanted filler might cause a visible bluish hue, known as the Tyndall effect. To manage these reactions, manual massage, aspiration, incision and drainage, or hyaluronidase are viable treatment options.

Early Major Complications

Although rare, severe complications like anaphylaxis due to an immediate hypersensitivity reaction can occur. These hypersensitivity reactions are estimated to occur in 1 in 10,000 individuals. Cases have been documented where a patient developed an angioedema-type reaction about an hour after Restylane injection into the lips, which resolved with corticosteroid injection. Consequently, it's crucial to have an emergency management protocol in your practice for such occurrences.

Post-procedure cellulitis, a common complication seen with any injection procedure, is usually caused by bacterial infection, predominantly from Staphylococcus and Streptococcus. Culturing lesions and treating with appropriate antibiotics is standard management. Pre-procedure cleansing with chlorhexidine can minimize the risk of infection.

The trauma from the injection can also trigger a recurrent herpetic lesion. Prophylactic antiviral treatment is recommended when injecting the lips and the procedure should be avoided during an active herpes outbreak. Inflammatory nodules may occur if bacteria is injected with the filler and gets encapsulated by the HA within the skin. These painful, red nodules can be treated with incision, drainage, culture, and a course of antibiotics, such as clarithromycin, for 2 to 6 weeks. Steroids are contraindicated in such cases. Extra care is necessary in patients with diabetes, immunocompromised conditions, chronic sinusitis, or chronic dental problems.

Delayed Major Complications

Granuloma formation is a delayed major complication that can occur six months after the injection. Though HA fillers are rarely linked to granuloma formation, it has been reported in 0.1% of patients, typically those injected with permanent or semi-permanent fillers. The body mounts a foreign body reaction, resulting in fibrosis at the injection site. Management includes steroid injections, surgical excision, or hyaluronidase.

Delayed hypersensitivity reactions can also occur, as was seen in a 2009 case report where a patient developed acute facial angioedema with urticaria three weeks post Restylane injection in her nasolabial folds.

The most severe delayed complication is tissue necrosis due to a direct blockage of a vessel, compression near the vessel, or injury to the vessel. The risk is 0.09% in patients who received collagen injections. The patient might experience delayed capillary refill, pain, followed by a mottled pattern of purple discoloration, and eventually ulceration due to necrosis. The glabellar area (due to blockage of the supratrochlear or supraorbital artery), the alar or nasal area (due to the blockage of nasal arteries), and regions along the facial and angular artery are common sites for this complication. Thorough knowledge of facial anatomy can help prevent this complication. Other preventive measures include aspiration prior to injection, slow

anterograde injection, constant needle movement, usage of small particle size fillers, superficial injection technique, avoiding injections near vessels, and using blunt tip cannulas to reduce the risk of intravascular injection. Management involves immediate cessation of the injection, massage, heat application, nitroglycerin paste (1/2 inch of 2% nitroglycerin) to vasodilate the area, and hyaluronidase to dissolve the filler. When nitroglycerin is used topically, patients should be warned of potential side effects, such as headache, bradycardia, and hypotension.

Re-emphasizing the Early Signs of Vascular Occlusion Complications

Early recognition of complications is key to effective management. The two primary diagnostic symptoms of vascular occlusion are pain and changes in skin color. Immediate, severe, and disproportionate pain and acute onset of color changes—blanching (or white spots/blotches)—are an indication of arterial occlusion. Venous occlusion may be associated with less severe, dull, or delayed pain; in some cases, there may be no pain (this is rare in the case of arterial occlusion). Skin color changes may be immediate or up to 3-4 hours later, and red/bluish coloration is indicative of venous occlusion.

Hyaluronidase

Hyaluronidase is an enzyme that hydrolyzes and breaks down hyaluronic acid, facilitating the successful elimination of unwanted HA implantation. It's been utilized effectively to correct asymmetry, overcorrection, Tyndall effect, and vascular occlusion. Hyaluronidase dissolves the filler and reduces edema, thereby helping to minimize occluded vessel pressure.

For use, hyaluronidase is diluted with saline in a 1:1 ratio. Mandatory skin testing involves injecting 3-5 units intradermally. A wheal formation within 5 minutes, persisting for 20-30 minutes with localized itching, indicates a positive skin test. A total of 10-30 units should be injected per 2×2 cm area of impending necrosis. It's crucial to check the package insert for any hyaluronidase product for complete instructions and information regarding warnings and contraindications.

Attempts should be made to dissolve or eliminate the injected product. In the case of hyaluronic acid-based fillers, hyaluronidase should be injected all over the affected area, "flooding the area with hyaluronidase", as soon as possible in a dose applicable to the product to be reversed, for example, 10-20 units per injection point.

Hyaluronidase injections should be repeated on a daily basis where appropriate and continued for at least 4 days or as long as there are signs of ischemia. An anticoagulant, such as low-molecular weight heparin, aspirin, clopidogrel, or pentoxifylline, could also be prescribed to increase blood flow to the wound. Other authors have suggested the use of sildenafil to dilate compromised vasculature.

Timing of Other Cosmetic Procedures

Botulinum toxin treatment should be planned 2 weeks prior to filler. Microdermabrasion, chemical peels, and intense pulsed light (IPL) should ideally be carried out 1-2 weeks pre-or post-treatment and fractional resurfacing 3-4 weeks distant to allow erythema to diminish and the skin barrier to reestablish.

In conclusion, although HA-based dermal filler injections have an impressive safety record, it's important for providers to familiarize themselves with the potential complications and their management. Meticulous injection technique, careful patient selection, pre and post-procedure care, and prompt complication management can significantly enhance patient safety and satisfaction.

https://youtu.be/BbhPD2JrtRc

For more information about Comprehensive Guide to Dermal Filler Injection Training, contact us at email@CosmeticMedicalTraining.com or call us at (212) 470-8059.

Originally published at **Dermal Filler Training San Francisco**