

Thomas Procedures in
FACIAL PLASTIC SURGERY
Non-Invasive Cosmetic Procedures

英文原版

Thomas 面部美容整形 非侵入性美容

R. JAMES KOCH



人民卫生出版社
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SOFT TISSUE FILLERS

JEFFREY D. POLLARD, MD, THOMAS H.M. MOULTHROP, MD,
AND CALVIN M. JOHNSON, JR., MD

Introduction

Surgeons are experiencing tremendous growth in the field of facial cosmetic surgery. Part of this growth is based on an increasing demand for non-invasive procedures which will offer valuable interventions to new patient populations, and augment or streamline interventions in the traditional patient population. These techniques are also being enthusiastically embraced by consumers. Many contemporary Americans would prefer to take a “pill”, or find a “quick fix” to resolve health and beauty issues rather than undergo more elaborate or time-consuming procedures. In addition to satisfying immediate gratification, these procedures can offer other valuable advantages.

Because there are an increasing number of treatment applications, and relatively few medical contraindications, noninvasive procedures have created an expanded treatment population, capturing younger and older patients. Fewer health and logistic restrictions allow for a relative ease of access to this form of treatment compared to traditional surgical procedures. Office-based treatment allows the surgeon to have more influence over the ambience and style of delivery, which also translates into convenient scheduling for patients and surgeons. In most situations, they offer high yield results with limited recovery demands, coupled with a comfortable treatment experience.

Soft tissue fillers (STFs) are a perfect example of this phenomenon. The only point of contention is that they are usually not a permanent solution. Although this seems inconvenient, conservative surgeons typically prefer non- or semi-permanent products in most applications, particularly when treating younger patients. Although not inherently

obvious to consumers or product designers, there is value and comfort in knowing that patients can elect to return to their original appearance if they desire.

There are increasing numbers of products becoming available, and as the field of STFs grows they will continue to evolve. There is no way to accurately predict which STFs will become FDA approved or be considered the mainstream in 5 or 10 years. For that reason, a lengthy discussion about the current popular materials is not warranted. Likewise there is little significance in discussing the STFs that “used to be”. Suffice it to say that there have been, and will continue to be, many advances with respect to safety, tolerance (allergy), consistency, pliability, treatment site duration, ease of use and deployment, shelf life, and preparation. Many current products perform well in these categories, and depending on the site of interest and the comfort level of the surgeon, a variety of products may be used.

STFs can be classified by the body’s ability to break down and excrete the material. All products fall into a spectrum of biodegradability. Along this continuum, there are tradeoffs with respect to treatment site duration and long-term complications such as granulomas and extrusion. Products also have distinct origins (autologous, cadaveric, bacterial, animal, synthetic, or otherwise bioengineered) which may have an impact at the time of delivery given a patient’s immunologic response, religious beliefs, and the physician’s overall comfort level with product design. The materials also have differing particle sizes and consistencies. Furthermore, some products are known for requiring a degree of “overcorrection”, while others do not. Lastly, some products have unique features like the radio-opacity of calcium hydroxylapatite.

TABLE 1-1 Types of Soft Tissue Fillers

Types of Soft Tissue Fillers
Collagen
Hyaluronic Acid
Fat
Acellular dermis
Polymethylmethacrylate beads
Calcium hydroxylapatite beads
Poly-L-lactic acid

The best choice of STF for any given surgeon is the one that maximizes each of the above valuable characteristics and can provide consistent and effective results in their hands. Because surgeon individuality plays an important role in this procedure, there may never be a unanimously favorite material. As new products emerge, they should be evaluated and compared to each surgeon’s current standard (Table 1-1).

Facial Analysis

Facial analysis has a more immediate level of significance with STFs because in many circumstances the treatment will be administered during the patient’s initial office visit. Therefore a rapid and accurate assessment must be made, and a focused and understandable treatment plan must be presented to the patient. Analysis is based on targeted

TABLE 1-2 Areas of The Face that tend to Exhibit Natural Facial Rhytids and Depressions Amenable to STF Therapy

Natural Facial Rhytids & Depressions
Glabellar region
Nasojugal grooves
Melolabial folds
Marionette lines
Perioral region
Chin region

facial units that are amenable to STF enhancement (Figure 1-1).

The nature of a STF is to camouflage, efface, or otherwise augment natural or secondary soft tissue depressions by providing a volume/mass effect controlled by the amount and consistency of the filler used. Specific to the lips, and in some cases the nose, a STF can be used to enhance fullness in a unit that has a natural tendency toward convexity. Thus, each treatment site should be evaluated with these specific goals in mind (Tables 1-2, 1-3, 1-4).

During the evaluation, be aware of pre-existing facial asymmetry. In addition, one should not lose sight of the fact that facial lines and depressions, whether natural or secondary, are a normal component of the adult human face. They can help to convey liveliness, animation, and character. In most circumstances they cannot, and should not, be *completely* effaced.

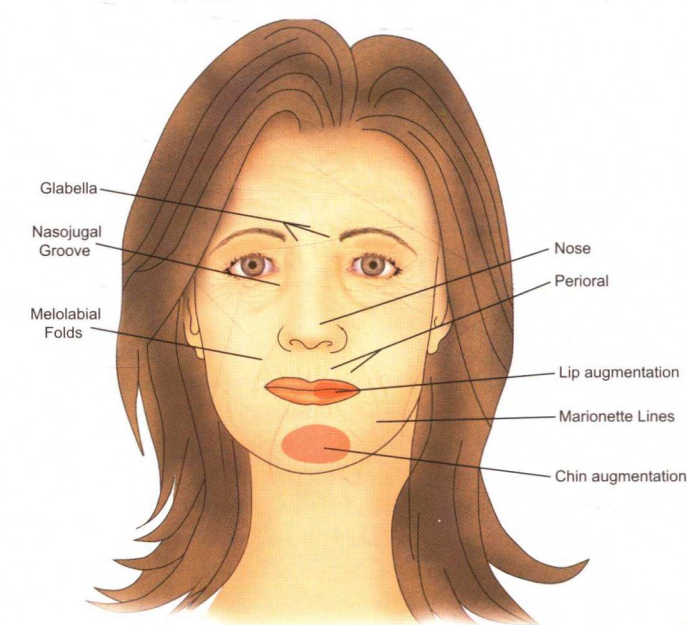


Figure 1-1. Targeted treatment sites.

TABLE 1-3 Areas of The Face with Natural Convexity Amenable to STF Therapy*Natural Facial Convexities*

Lips
Nasal tip

TABLE 1-4 Special Facial Applications For STFS*Special Applications*

Depressed scar effacement
(Traumatic, iatrogenic, acne)
Post-rhinoplasty augmentation
Cheek Augmentation
Lateral Brow Enhancement
Temporal Atrophy

Preoperative Considerations

Approach

Because STFs are often readily available for application, the surgeon must build a level of trust (rapport) with new patients in a more rapid sequence than is generally necessary with patients considering invasive procedures that require a longer consultation, deliberation, and scheduling period.

Although the term “noninvasive” may convey a sense of security and immunity, due diligence is required on the part of the surgeon. In addition to obtaining a standard medical history, assessment of medications, and allergies, each patient should be asked targeted questions related to facial STF treatment (Table 1-5).

Contraindications

Patients with a known allergic response to any component of a particular product, or with a general history of anaphylaxis should not be considered for STF augmentation. Other contraindications

include: (1) autoimmune, dermatologic, or other systemic disorders that predispose to poor wound healing or an exuberant inflammatory response to tissue manipulation (e.g., the Koebner Phenomenon), and (2) active infection at the treatment site. Blood thinners can be considered a relative contraindication.

Consent

Once a candidate is deemed to be appropriate for treatment, a formal consent process should ensue. Among other standard consent items, the patient should be counseled regarding the anticipated need for repeat injections (a general guideline is 6 to 9 months). At times, serial injections at 4 to 6 week intervals may be needed for optimum aesthetic outcome at a given site. Because of the evolving nature of STFs, surgeons should routinely review and become familiar with specific product labeling, manufacturer’s indications and recommended depth of treatment, and any ancillary test requirements (primarily allergy testing). Key product-specific and defining characteristics such as the origin and make-up of the material should be touched on. Certain products are being used for “off-label” (non-FDA approved) applications and, when applicable, this should be disclosed during the consent process. Additionally, photographs should be consented to and obtained before and after the procedure.

Setting Up

The setup should be well thought out and practical. A simple tray would typically include a cleaning agent, anesthetic of choice, alcohol prep pads, gauze pads, needles, the STF, sterile gloves, an ice pack or cool compress, and a handheld mirror (Figure 1-2). As discussed in the introduction, the STF of choice will depend on a number of variables including site of treatment, depth, and area of coverage, product feel, and experience.

Technique

The nature of soft tissue augmentation is typically repetitive. Therefore, particular attention must be paid to the delivery, results, and overall patient experience to solidify the patient’s confidence in the product and the surgeon. Attention to these details will increase the patient’s satisfaction and likelihood to follow up for additional treatment. The following is a recommended sequence of events that can be

TABLE 1-5 Treatment Specific Questions*Treatment Specific Questions*

Allergies
Autoimmune or dermatologic conditions
Past facial treatments
Current facial treatments
Prior experience with STFs
Pain/needle tolerance
Specific expectations



Figure 1-2. Typical procedure setup.

applied to any treatment site. Site-specific considerations will be discussed in the next section.

1. Prepare the patient for the experience.
2. Clean the face to remove make-up.
3. Depending on the patients expectations, experience, and pain tolerance, address the need for topical or regional anesthesia. Approaches to anesthesia include one or any combination of: verbal reassurance, auditory diversion with soft music, distraction by stimulating a separate pressure point, ice, topical agents like betacaine, and injection of an anesthetic agent as a field or regional nerve block. General anesthesia can be administered when STF's are used as an adjunct to invasive procedures in the operating room. It is advisable not to pre-inject the treatment site, as the anesthetic volume will augment the appearance of the site. Some products contain lidocaine which acts at the treatment site immediately following the application.
4. Keep the patient in a comfortable semi-recumbent or upright position. This will maintain the natural appearance of the treatment site and allow for better judgment during the procedure.
5. Prepare the treatment site with a sterilizing agent such as rubbing alcohol.

TABLE 1-6 Preferred Injection Techniques

Preferred Injection Techniques
Serial puncture
Linier threading
Fanning
Cross-hatching
Layering

6. Prime the STF by activating the syringe until the material is expressed at the tip of the needle. In most cases, 30- or 27-gauge needles are indicated. Changing the needle gauge will affect the flow rate of the material and the degree of tissue trauma.
7. Insert the needle (typically with the bevel up) and inject the STF using one or more of the preferred injection techniques (Table 1-6). In typical applications, the STF should be delivered into the mid to deep dermis or at the junction of the deep dermis and subcutaneous fat. Injections into the superficial dermis have a limited application in the treatment of fine superficial lines, but may cause striking tissue distortion and higher rates of extrusion. Deeper injections will tend to have much less surface definition and typically result in wasted STF volume. In addition, some thicker products (e.g., cross-linked collagen) have been associated with vascular compromise following deep injections.
8. After the needle is inserted, deposit the material by using steady pressure on the plunger while withdrawing the needle at an even rate. Real-time visual assessment of the treatment site during application of the material will enhance the surgeon's judgment about the volume needed to achieve a successful injection.
9. After each injection, re-evaluate the site visually and with gentle palpation. Make note of any irregularities.
10. Re-inject if needed. It is advisable to limit the number of repeat injections, as each additional injection is associated with diminishing returns related to judgment (due mostly to localized swelling), in addition to causing further pain, tissue trauma, and potential for bruising. Needles will become dull with use, so changing needles frequently will allow for a more accurate and smooth delivery.
11. Palpate the site and gently massage the STF to promote a smooth and even distribution

of the material. The procedure is generally forgiving if too much material is injected or there is an uneven distribution of the material. Excess material can often be redistributed or even expressed out of the insertion site using digital massage. Holding gentle pressure at the insertion site can help to limit bleeding and bruising.

12. When satisfied with the look and feel of the treated site, consider showing the patient the immediate results. This serves a dual purpose. First, it gives the patient a reasonably valid reference point about the final result. In the hours and days to come, the patient may express anxiety about looking “overdone”. These feelings can be quelled by reassuring the patient with respect to swelling, and by asking them to recall the way the site appeared in the office. Second, it is often difficult for a patient to remember the original appearance of a treatment site (even minutes after the injection). Therefore, as an aid to emphasizing the before and after appearance, it is helpful to show a “side to side” comparison when possible – for example when treating bilateral Melolabial folds.

In some, but not all cases, an interactive approach like this can help to embolden a patient’s trust, confidence, and overall satisfaction with the surgeon and the procedure.

Preferred Injection Techniques

Serial Puncture

Using serial punctures, the needle is inserted at a 45 degree angle to the desired depth and the STF is injected while maintaining the position of the needle (or with minimal traveling of the needle). This technique is ideal for “spot” applications such as acne scars or when addressing the nasal region. It may also be the method of choice for beginners, as it allows the surgeon to break the treatment site down into smaller segments which can be addressed in “baby steps” (Figure 1-3A & C).

Linier Threading

Linier threading is the most widely used technique for routine rhytids of the face. Here the needle is inserted more shallow to the desired depth and then quickly lowered to a near parallel orientation to the plane of the treatment site. The needle is advanced at an even depth along the length of the rhytid. Advancement is typically limited by the hub

of the needle, although some advanced users will extend the length of advancement in select cases by allowing the skin to bunch up at the hub. Finally, the needle is withdrawn at a steady rate while the plunger is depressed with a constant pressure (Figure 1-3B).

Fanning & Cross-Hatching

The fanning technique utilizes linear threading in a serial fan-like distribution either through a single or multiple entry sites. This, along with the cross-hatching technique, which is defined by a checkerboard pattern, is used primarily for deeper and more voluminous injections where bulk STF needs to be applied in a smooth and widespread distribution (Figure 1-3C, D).

Layering

Layering is a technique that can be used when addressing very deep rhytids. Typically a thicker material is injected at the junction of the dermis and subcutaneous fat, followed by a smaller particle STF more superficially. This approach allows the surgeon to eliminate a majority of the problem with a deeper, bulkier product, while maintaining a controlled and polished finish by switching to a material that allows for more superficial finesse.

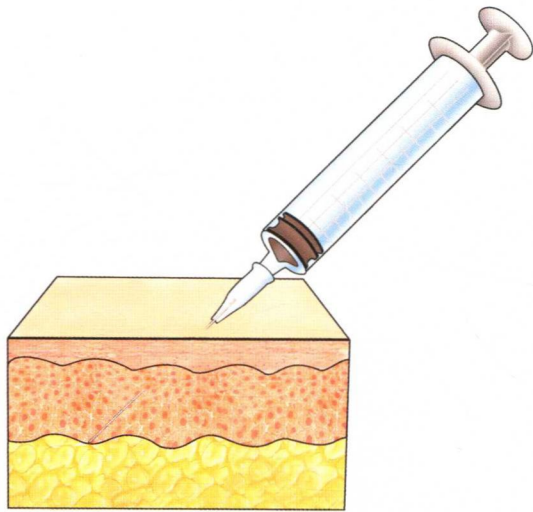
Natural Facial Rhytids and Depressions

The Glabellar Region (Figure 1-4)

Because of the orientation and habitual contraction of the corrugator and procerus muscles, the glabella has the potential to develop deep and striking rhytids. Although botulinum toxin is the first line of treatment to reduce and prevent progression of the glabellar furrows, they will often need to be addressed with a STF as an adjunctive procedure. There is added value in combining botulinum toxin with a STF in that it may help impede the metabolism and migration of the material in highly animated areas of the face (Figure 1-5).

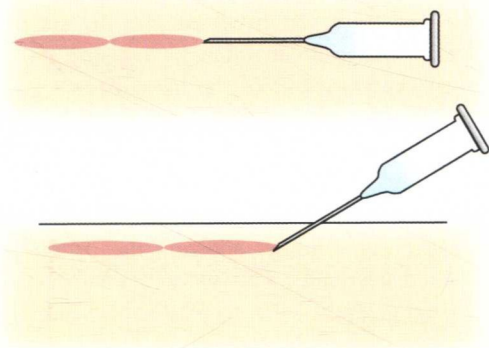
Nasojugal Grooves (Figure 1-6)

The naturally occurring fold or hollowing known as the tear trough deformity is a product of regional volume loss, elastosis, and ptosis of the malar soft



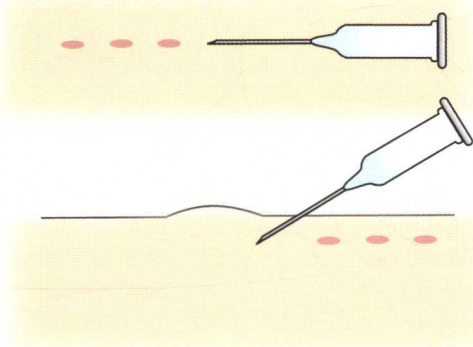
A

1.Linear threading



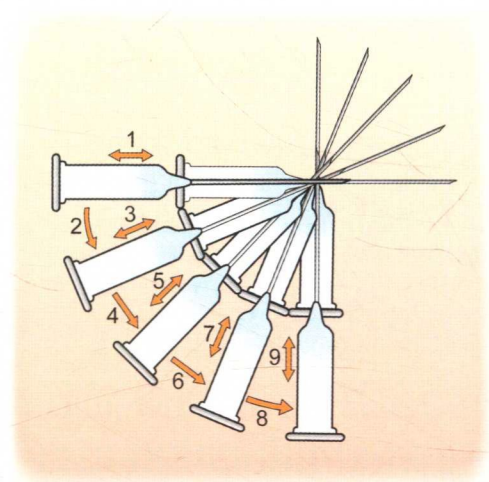
B

2. Serial puncture



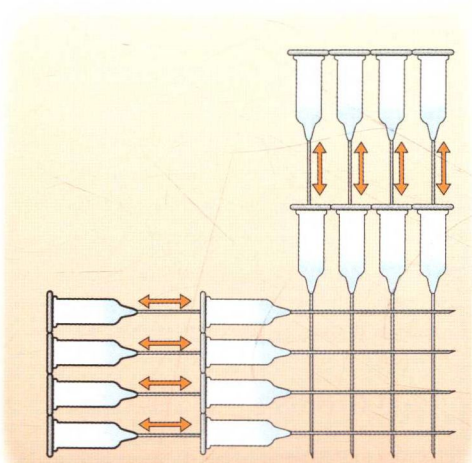
C

3. Fanning



D

4. Cross hatching



E

Figure 1-3 A-E. Injection techniques.

Glabellar lines

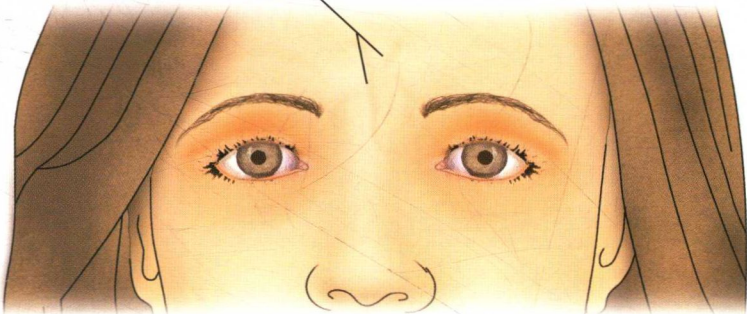


Figure 1-4. Glabellar region.



Figure 1-5. Before and after glabellar STF.

Nasojugal Groove

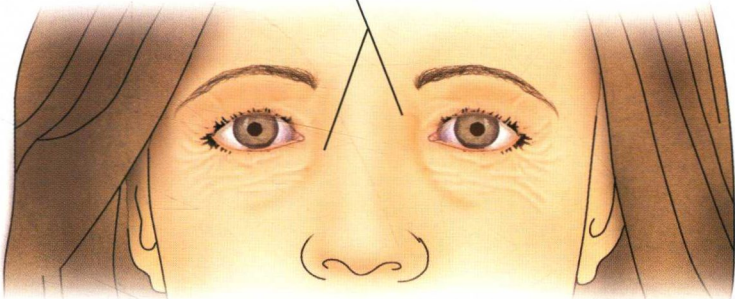


Figure 1-6. Nasojugal grooves.

tissues contrasted with the pseudoherniation of the lower orbital fat pads seen with typical aging. Malar fat repositioning and lower blepharoplasty comprise the traditional approach to this situation. However, STFs can be used as adjunctive treatment or even as a stand alone procedure. When addressing the Nasojugal groove, consider using a broader distribution of material and start with a conservative goal in mind. Keep in mind that the nasojugal groove encompasses a transition zone from eyelid skin to cheek skin. The quality and characteristics of these two skin types differ somewhat. Because the lower eyelid skin is considerably thinner, injections that are placed too high are likely to create lumps. Serial injections of “microdrops” down on the periosteum provide for an evenly distributed and natural filler result. Note that the nasojugal groove is also very susceptible to edema related to allergy and inflammation. Patients with this tendency should be approached with caution, because fluctuations in tissue edema will affect the treatment result (**Figure 1-7**).

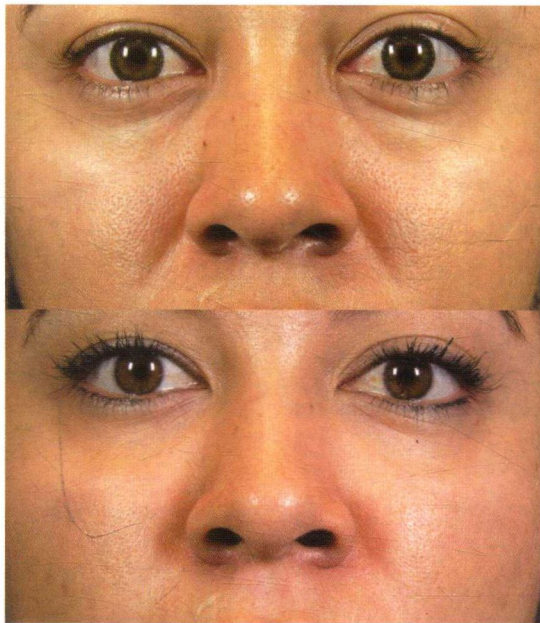


Figure 1-7. Before and after nasojugal groove STF.

Melolabial Folds (Figure 1-8)

Perhaps the most frequently treated facial rhytid, STFs offer distinct advantages for treatment of the melolabial folds. For one thing, the melolabial folds (also referred to as the nasolabial folds) aren't completely addressed by any invasive procedures

without the risk of distorting surrounding facial features. In addition, the cost-benefit considerations when comparing to a rhytidectomy, heavily favor the STFs. A standard approach to the melolabial fold is the linier threading technique. Layering may

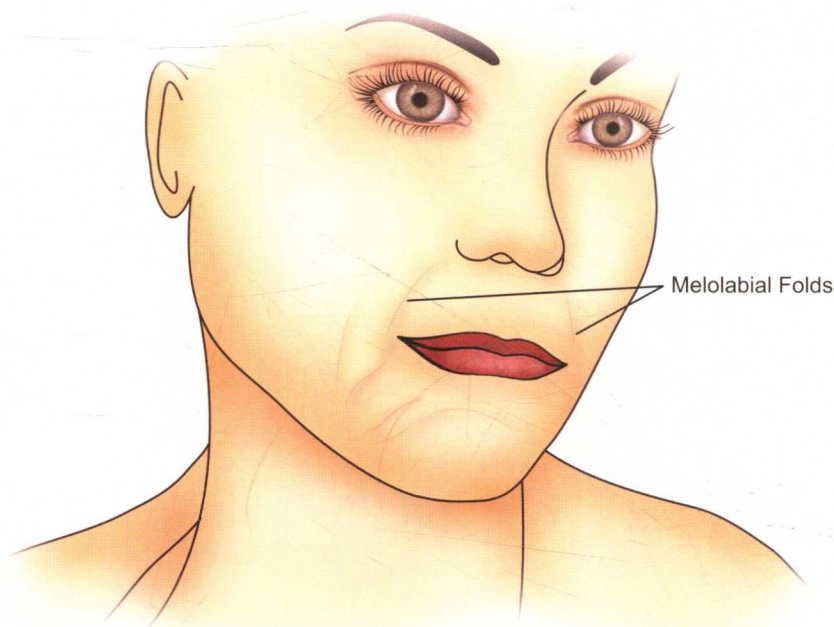


Figure 1-8. Melolabial folds.

also help to achieve reduction of moderate or deep folds while maintaining a controlled and polished finish. Cross-hatching or fanning out the STF at the melolabial triangle (formed at the superior aspect of the melolabial fold as it approaches the alar groove) will help to soften this transition area (**Figure 1-9**).

Perioral Region (**Figure 1-10**)

Repetitive contraction of the orbicularis oris muscle combined with age-related volume loss are intrinsic causes to fine radial rhytids about the lips. Extrinsic factors such as sun-related elastosis and smoking can expedite and worsen the appearance of these lines. STFs can be used as stand alone treatment or as an adjunctive procedure following chemical, laser, or other re-epithelializing treatment of the perioral complex. Persistent radial lines and the occasional mid-philtral horizontal crease are best approached with a relatively thin and soft material. This will allow the surgeon to use a 30-gauge needle in this highly sensitive area, and provide for a more natural appearance and feel. The liner threading and serial puncture techniques can be applied here, as each line is treated with a separate needle stick.

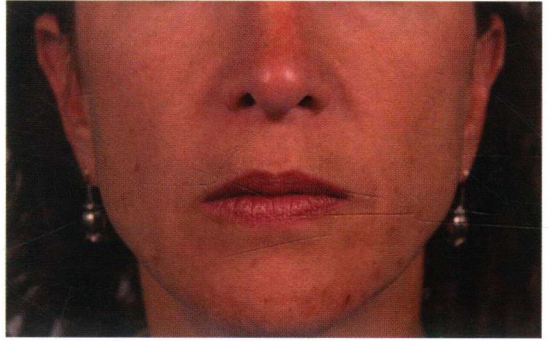
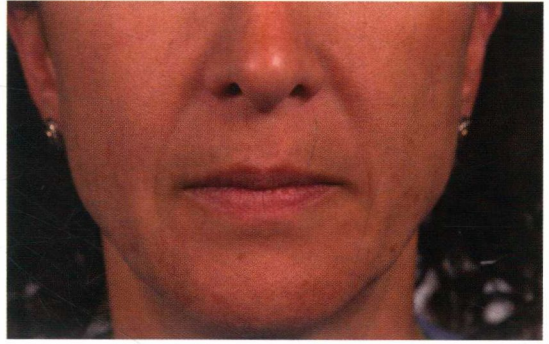
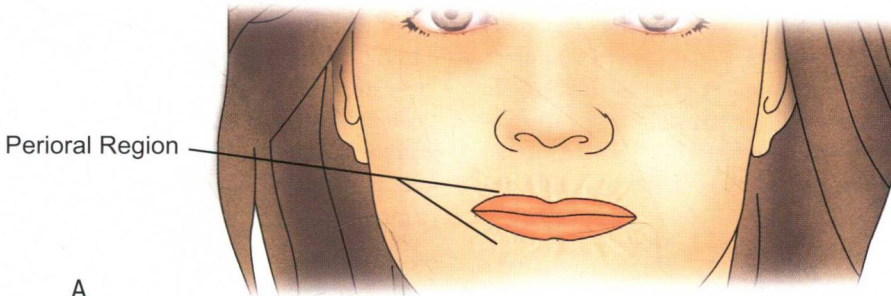
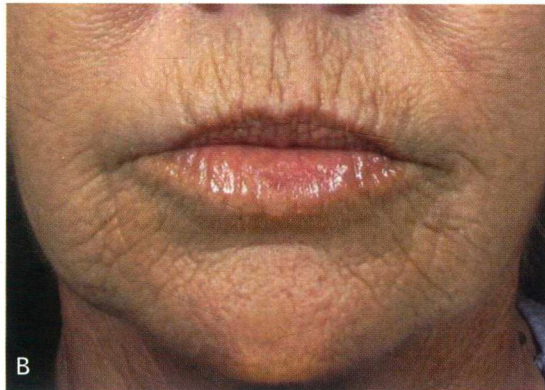


Figure 1-9. Before and after melolabial fold STF.



A



B

Figure 1-10. A and B, Perioral region.

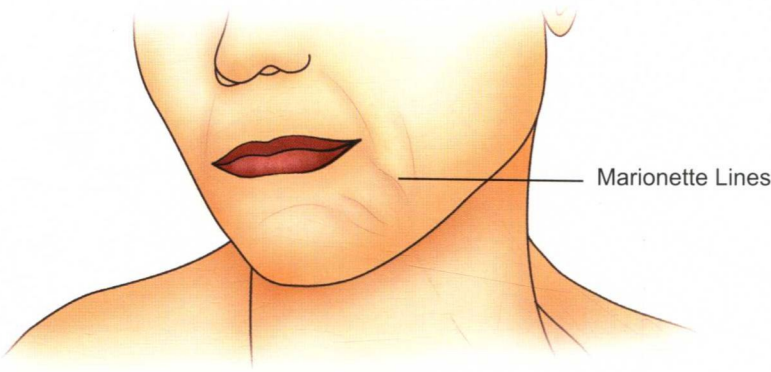


Figure 1-11. Marionette lines.

Due to what is believed to be heightened mobility of the tissues, STF's may have a shorter treatment duration when applied to the perioral region. In light of this, patients need to be counseled regarding the likely need to treat on a more frequent basis. Characteristics specific to each patient and STF used will define the optimal time frame.

Marionette Lines (Figure 1-11)

Age-related ptosis and volume loss of the midface combined with perioral muscle activity could translate into a distinct rhytid or fold that extends inferiorly from the oral commissures. These marionette lines are inferior and medial to the melolabial folds and tend to run in a parallel fashion to them. In many ways, the treatment is the same as for melolabial folds. Fine lines can be addressed with a smaller needle in a linear threading or serial puncture approach. With deeper folds, consideration should be given to layering. With any perioral application,

patients should be counseled about the possibility of more frequent treatment sessions (related to increased mobility of the area and injectable volume limitations) (**Figure 1-12**).

Chin Region (Figure 1-13)

Activity of the mentalis muscle over time can cause a transverse furrow to evolve between the chin and the lower lip. In addition, dimpling and other fine lines can form in this region. Because of its strength and location, the mentalis muscle is a good candidate for conservative botulinum toxin therapy. As with the glabella, there is added value in combining botulinum toxin with a STF in that it may help impede the metabolism and migration of the material in this area. The linear threading technique can be used for transverse furrows, while dimples and smaller lines can be addressed with serial punctures. Deep furrows may benefit from layering (**Figure 1-14**). Consider performing a subcision of

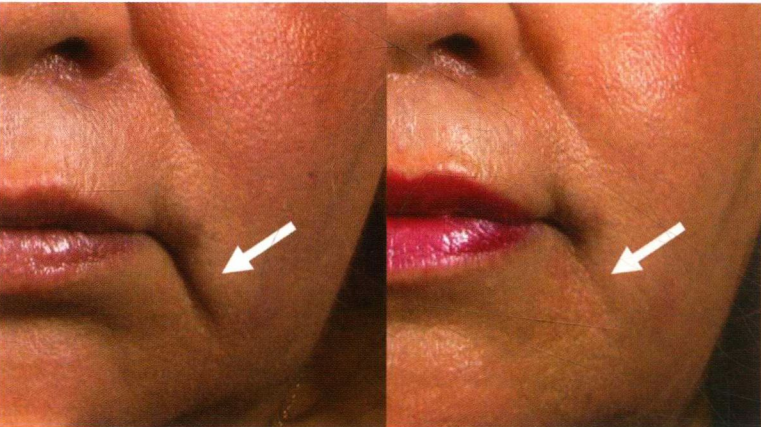


Figure 1-12. Before and after marionette line STF.